PROFITABILITY OF PUT AND CALL OPTION WRITING

by

Richard Claus Katz

B.S., Columbia University

(1960)

SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

1962

Signature of Author . . . . . .
School of Industrial Management

Certified by . . . . . .
Faculty Advisor of the Thesis

Professor Philip Franklin

Secretary of the Faculty

Massachusetts Institute of Technology

Cambridge 39, Massachusetts

Dear Professor Franklin:

In accordance with the requirements for graduation, I herewith submit a thesis entitled "Profitability of Put and Call Option Writing".

Sincerely yours,

Richard Claus Katz

ABSTRACT

PROFITABILITY OF PUT AND CALL OPTION WRITING

by

Richard Claus Katz

Submitted to the School of Industrial Management on May 23, 1962, in partial fulfillment of the requirements for the degree of Master of Science.

Put and call option writing is a segment of investment activity on which there has been little intensive research. It is widely believed that option writing, while being a profitable auxiliary activity in the management of an investment portfolio, is not a profitable investment medium in its own right. This study is aimed at evaluating put and call option writing as an investment medium.

The profitability of option writing is estimated by calculating the profits made by 76 option writers on 851 option contracts written over a 21-month period, April 22, 1960 to January 30, 1962. To calculate writer gains, the data describing each option contract first had to be coded and prepared for processing. Then the average rate of return per option sold was chosen as the best method of evaluating the overall profitability of the writing activity. A computer program was now written to calculate the profit associated with each possible option type and option outcome encountered in the data studied.

The actual profitability of option writing found was contrasted with the profits option writers could have made by using other feasible strategies. The strategy actually used was the best one of those examined. However, it yielded a -0.1% rate of return or -$8 per option contract sold.

Next, the profitability of each option writer was contrasted with his opportunity cost. Thirty-three of the 50 writers who made a profit and 22 of the 26 who lost money would have had higher profits or smaller losses by not writing options.

Some of the characteristics of all option contracts which may influence or determine profitability were now examined. A significant positive correlation between option outcome and duration was found. Longer duration options yielded higher profits for the option writers. A relationship between outcome and option striking price was also indicated. Puts and calls were found profitable while money was lost on straddles. If just margined puts and hedged calls were sold on

different stocks, the writer would eliminate the possibility of large double losses occurring from a sizable drop in the price of the stock optioned.

A measure of the "investment quality" of a stock was considered as a method of predicting the profitability of writing options on particular stocks. The relation between the quality rating and the profitability of writing options on stocks with that rating was found significant. The average investment required for stocks in each quality group had a high positive correlation with the quality rating. This substantiated the relationship found earlier between outcome and option striking price. Higher priced stocks are usually higher quality stocks and are usually more profitable for option writing than lower priced stocks.

The investment quality rating was used to evaluate the effects of option writing on option writers' investment portfolios. No significant change in the quality level of option writers' investment portfolios was found.

The actions of a hypothetical option writer given various fixed amounts of initial capital and facing the option writing opportunities studied in this thesis were simulated. The results indicate that option writers can make profits with small amounts of capital devoted to option writing. However, while the evidence is not conclusive, there is some indication that the variability of one's initial capital increases with a decrease in initial portfolio size.

In summary, this study has shown that option writing as a whole was not profitable over the 21-month period considered. The evidence indicates that option writing under the strategies investigated cannot be considered a desirable investment medium in its own right. Therefore, option writing may be useful only as an auxiliary activity in the management of an investment portfolio unless other writing strategies show that profits can be made over an extended period of time from this activity.

Thesis Advisor: Paul H. Cootner
Title: Assistant Professor of Industrial Management

ACKNOWLEDGMENTS

The author wishes to thank Professor Paul Cootner for his counsel and advice in the preparation of this thesis. James Boness has also been a wonderful sounding board for the author's ideas. This study would not have been possible, however, without the cooperation of the Denmar Corporation which provided the put and call option data used in this thesis. Last, but far from least, are my friends who made it possible for me to complete this manuscript today, of whom Jean VanDerlip and Sally Decker should be given special acknowledgment.

The M.I.T. Computation Center with its 7090 computer and the School of Industrial Management computation facilities were utilized in this study. Appreciation is due to the staffs of both facilities for their cooperation and assistance.

TABLE OF CONTENTS

LIST OF EXHIBITS

LIST OF FIGURES

LIST OF TABLES

CHAPTER I

INTRODUCTION

Put and call option writing is a segment of investment activity on which there has been very little intensive research. It is widely believed that option writing, while being a profitable auxiliary activity in the management of an investment portfolio, is not a profitable investment medium in its own right. This study is aimed at evaluating the profitability of put and call option writing as an investment medium.

The Extent of Put and Call Option Trading

In 1960, put and call option sales were 1.12 per cent of New York Stock Exchange volume.[1] Thus, 8,470,000 shares of stock, or 84,700 100-share lots were optioned during 1960. This is an increase of 620 per cent in number of shares optioned since 1943, during a period when the number of shares traded increased only 275 per cent. The dollar volume of shares optioned during 1960 was $288,000,000. Put and call option trading therefore is a significant and rapidly-growing segment of investment activity.

What Are Put and Call Options?

A call option gives the owner the right to buy a stock at a specified price during a fixed period stipulated in the option contract. A put contract is an analogous instrument giving the owner the right to

---

[1] Report on Put and Call Options, Securities and Exchange Commission, Division of Trading and Exchanges, August, 1961. Other volume estimates are based on figures found in this report and the 1961 and 1944 issues of The New York Stock Exchange Fact Book.

sell a stock at a specified price during a fixed period set in the option contract. The price at which the stock is exercisable--the "striking price"--is usually the market price of the stock on the date the option is written--the "trade date". The option duration extends to the expiration date of the option contract. Options are usually written on 100 shares of stock. They are often sold in multiple combinations of puts and calls. Thus, a put plus a call is a "straddle", a put plus two calls is a "strap", a call plus two puts is a "strip", and a call plus a put where each side of this option has a different striking price is called a "spread".[2]

How Option Trading Works

If a person wishes to purchase a stock option, he must find a person willing to write an option contract. This search is facilitated by put and call option dealers who act as middlemen. The dealer will contact a writer, negotiate the price of the option with both the buyer and writer, and make his profit through the difference in the two prices. A member firm of the New York Stock Exchange, usually the writer's broker, will endorse the option contract. This endorsement guarantees that the writer will carry out the terms of the agreement. The writer's compensation is called the option premium.

The dealer will be willing to buy either a put or a call independent of the wishes of the option buyer. He is willing to do so because a put can be converted to a call and vice versa. If a put is

---

[2]See Herbert Filer, Understanding Put and Call Options, Crown Publishers, New York, 1959, for a fuller explanation of these basic characteristics of put and call stock options.

owned and the stock on which the option is written is purchased, the position is equivalent to a call. No losses can occur from a decline in the price of the stock, but gains are unlimited. Similarly, if a call is owned and the stock on which the option is written is sold short, the position is equivalent to a put. No losses can occur from a rise in the price of the stock optioned, but all gains due to a fall in the price of the stock are realized.[3]

Option Writing Requirements

The New York Stock Exchange requires option writers to hedge or margin option contract sales. A call option can be hedged by purchasing the stock optioned. The writer is then in a position to deliver the stock if it is called. A put can be hedged by selling short the stock optioned. This short position insures that the writer will be able to accept delivery of the stock if it is put to him.

Option contract sales, alternatively, can be margined. This margin, however, is not the same as the regular stock market margin where a certain percentage of the price of the stock must be paid to take the stock position, the remainder being borrowed. No stock position is taken when stock options are margined. The capital invested can be considered a "performance" margin, sufficient capital to guarantee that the option writer will fulfill the terms of the option contract. Minimum New York Stock Exchange margin requirements

---

[3]A detailed explanation of this procedure can be found in Richard Kruizenga, Puts and Calls: A Theoretical and Market Analysis, unpublished Ph.D. thesis, M.I.T., 1956, p. 9.

are 25 per cent for a put and 30 per cent for a call.

Method of the Study

To evaluate option writing profitability, a data sample of 851 option contract sales by 76 option writers covering a period from April 22, 1960, to January 30, 1962, was used. Computer programs were written and used to process and prepare the data for analysis. Proper methods for evaluating profitability were investigated. The average rate of return per option contract sold was chosen as the best criterion of profitability.

A computer program which calculates option writing profitability under the strategy used by option writers and under other feasible stragegies was written. The strategy actually used by writers was to hedge calls and margin puts. Four other strategies were investigated, involving different methods of hedging and margining option contract sales. They are: (1) margining puts and calls; (2) hedging puts and margining calls; (3) hedging calls, puts, and call sides of two-sided options and margining put sides of two-sided options;[4] and (4) hedging calls, puts, and put sides of two-sided options and margining call sides of two-sided options. The data was processed through the option writing profit program, calculations being made for each of the strategies. The calculations under some strategies were run twice where it was felt appropriate to compare results under minimum and maximum hedge and margin requirements.

---

[4]Two-sided options are straddles, strips, straps, and spreads.

To determine any significant relationships existing in the option contracts studied, the data was grouped by significant variables and processed through the option writing profit program under the strategy actually used by the option writers. The groupings used were option type, duration, outcome, writer, striking price, trade date, and expiration date. Another program was used to calculate the opportunity cost of the writers.

To evaluate the possibility of using some quality measure to determine the attractiveness of particular stocks for option writing, the options were grouped according to an investment quality rating devised by the Value Line Investment Service. These groups were then processed through the option writing profit program to determine the relationship existing between this particular quality rating and the profitability of option writing.

The effect of option writing on the quality level of option writers' investment portfolios was calculated to determine if writers were significantly changing the quality level of their investment portfolios by accomodating the option-buying desires of their customers. This was done by dividing the option sample into two groups, the first group containing those options which were hedged with previously-owned stock and the second group containing put options and those options hedged by purchasing stock in the market. The significance of differences in the mean and standard deviations of the quality levels were evaluated by "t" and "F" tests.

To examine the effects of portfolio size on the variability in the value of an option writer's portfolio, the actions of a hypothetical option writer were simulated via a computer program. The

option writer was assigned various amounts of initial capital and faced the option writing opportunities considered in this study.

Organization of Thesis

The thesis has been organized largely in accordance with the steps taken in the analysis of profitability as outlined in the method of study section above.

Chapter II describes in detail the methods by which the data used in the thesis was assembled, coded, and prepared for processing. The specific variables associated with each option contract sold are identified and defined.

Chapter III first investigates the appropriate measure of profitability to use in evaluating option writing. Then, the method of calculating the gross profit on a writer's investment is described. The investment required for each option contract sale is considered next. The costs associated with the writing, exercise, or expiration of an option contract are enumerated. Finally, the computer program used to calculate option writing profitability is described.

In Chapter IV, the actual profitability of option writing is calculated and contrasted with the profits option writers could have made using other strategies. Then the profitability of each option writer is contrasted with his opportunity cost. Characteristics associated with all option contracts which may influence or determine profitability are investigated next.

In Chapter V, the question of whether some measure of the "investment quality" of a stock can be associated with the attractiveness of that stock for option writing is considered. Then, the

effect of option writing on the option writer's investment portfolio is investigated.

Chapter VI examines the effects of portfolio size on the variability in the value of an option writer's portfolio. It also considers the question of the minimum amount of capital necessary to engage in option writing.

Chapter VII deals with leverage, protection, and the effects of taxation in enhancing the profitability associated with put and call option writing.

Chapter VIII presents a summary of the results, the conclusions arrived at, and suggestions for further research.

CHAPTER II

PUT AND CALL OPTION DATA

This chapter investigates the nature of the put and call option data studied. The distribution of option contract trade and expiration dates over the time period considered is investigated. The methods by which the data was assembled, coded, and prepared for processing are described. Then the specific variables associated with each option contract sold are identified and defined.

The option data used in this study consists of 851 100-share contracts having trade dates between April 22, 1960, and November 21, 1961. Expiration dates range between October 10, 1960, and January 30, 1962. Information was available on option contracts which were to expire after January 30, 1962, but were exercised before this date. This data was not included in the sample, since it might bias results by not accurately representing profitability experienced by option writers during this later period. The distribution of option trade dates and expiration dates in the sample is shown in Table 1.

Options are numbered from 1 to 1034. Of these numbers, 183 have no corresponding option contracts because either:

(1) Information on this contract was sufficiently incomplete to warrant exclusion, or

(2) The contract was exceptionally unusual, e.g., a straddle with the two sides having widely differing durations, or

(3) The contract was a duplicate of one already included, or

(4) No contract was assigned to the number because small number spacings were left between groups of data received at different times, or

(5) The contract assigned to this number expires after January 30, 1962, the end of the period under consideration (applies to options 761 to 1034).

Identification numbers 1 to 760 were assigned to the option data as it was assembled. Numbers 761 to 1034 were assigned by adding 760 to the transaction number assigned by the data source.

For option contracts other than 681 to 750, all information relating to the outcome of the option contract was available. The outcomes for options numbered 681 to 750 were determined as of the expiration dates of the option contracts.[1]

The information for options 1 to 760 was prepared from copies of the records of Denmar Corporation and coded in a format described in Exhibit 1. Exhibit 2 defines each of the variables coded. Exhibit 3 presents the date coding used. Exhibit 4 presents the code numbers of the stocks on which options were written and their Value Line quality ratings[2] (if assigned). Exhibit 5 presents the option dealer and endorser codes used. Appendix 1 has a copy of the data for each option in the study. Most of the necessary information on options 761 to 1034 was put on punched cards at the source and

---

[1]Since about 25 percent of the contracts in the rest of the samples were exercised early, about eighteen contracts should not have been assumed exercised on the expiration date.

[2]This will be more fully explained in Chapter 5.

transformed to the format used here through a series of computer programs. Information on expiration date prices and in some cases date of action prices and interim dividends was lacking and found in Moody's Dividend Record and The Commercial and Financial Chronicle. Prices taken from the Chronicle were the average of the high and low prices for the day.

Option data supplied on punched cards had the stocks optioned and option types coded alphabetically. The first program[3] used transformed the alphabetical representation of option type to a numerical form corresponding with the author's code, and substituted a unique number for each different stock symbol encountered. These revised punched cards were then transformed by a second program to a format similar to the author's.[4] Correct stock identification numbers were then substituted by hand in place of the coding done by the first program used.[5] In addition, dividends paid during the period each option was outstanding were recorded on the final data cards along with expiration date prices where necessary. The data was now processed through a final program which converted the card

---

[3]This program had to be written in SPS, since the IBM 1620 does not accept alphanumeric input with FORTRAN. The program was written by Robin Hough, Ph.D. candidate in Economics at M.I.T.

[4]This program will not process strips and straps. Data on these options must be converted by hand to the author's format.

[5]When a sufficient volume of data with alphanumeric coding is to be transformed to the author's format, a master set of lead cards should be punched which has the stock symbols arranged in proper coded sequence so that additional recoding such as the author has done will not be necessary.

2 format then existing to the present card 2 format used by the author. This version, very similar to the card 1 format, was adopted to permit sorting on columns with pertinent information. Appendix 2 contains copies of all the programs used to transform the data supplied by Denmar Corporation to the author's format. Sample outputs from some of these programs are also presented.

All final data cards were run through an error checking program, similar in some respects to the Fortran Pre-Compiler, except checking for errors in the input data rather than in the program used to process the data. This program[6] is designed to check relationships in the data and actual data quantities, punching out error signals when an unusual quantity or relationship exists. Exhibit 6 summarizes the unusual relationships detected. Exhibit 7 presents a sample of results obtained using this program. Appendix 3 presents a copy of the program itself.

This program was especially valuable for checking the option data (option numbers 1 to 760) entirely processed by hand because of the high likelihood of errors occurring while coding information and transferring it to punched cards. Because this type of error could not occur in the data transformed by the computer to the author's format (option number 761 to 1034), the program was useful here only in checking that obviously impossible relationships did not exist on the original data cards.

---

[6]The error check program only checks the first card where two cards are needed to describe all the data relevant to an option contract. The program is not presently written to accept a second card as input, and these cards should be deleted when the program is used or the program should be modified (a simple task) to at least allow the second card to be read in if present.

TABLE 1

DISTRIBUTION OF OPTION TRADE DATES
AND EXPIRATION DATES IN SAMPLE

Number of Options Having Trade Date	Number of Options Having Expiration Date	Between Dates Indicated
11		4/22 and 5/31/60
8		6/1 6/30/60
6		7/1 7/31/60
12		8/1 8/31/60
16		9/1 9/30/60
24	5	10/1 10/31/60
39	16	11/1 11/30/60
74	18	12/1 12/31/60
76	15	1/1 1/31/61
72	41	2/1 2/28/61
114	36	3/1 3/31/61
87	45	4/1 4/30/61
56	73	5/1 5/31/61
92	80	6/1 6/30/61
60	72	7/1 7/31/61
38	89	8/1 8/31/61
34	76	9/1 9/30/61
23	102	10/1 10/31/61
9	53	11/1 11/30/61
	60	12/1 12/31/61
	70	1/1 1/30/62
851	851	

EXHIBIT 1

DATA FORMAT

One or two cards are used to describe an option contract. Two cards are used if an option is a strip, strap, straddle, or spread and one side of the option is exercised early or both sides of a straddle or spread are exercised or two calls or two puts are exercised on a strap or strip.

Card 1

Item[1]	Punched Card Column Numbers Used
Option Writer	1-3
Premium	5-11
Expiration Date	13-16
Stock	18-20
Trade Date	22-25
Type Option	27
Striking Price (Call Price is spread)	29-35
Market Price when option written (negative if stock purchased to hedge)[2]	37-44
Option Dealer[3] (see dealer code--Exhibit 5)	46
Option Endorser[3] (see endorser code--Exhibit 5)	48
Action taken	50
Date Option Exercised (blank if expired)	52-55
Market Price of stock when option exercised (first 100 shares if 200 exercised but call price first if call and put exercised)	57-63
Option Identification Number	75-78
Number 1 if 2 cards used; otherwise blank	80

---

[1]See Exhibit 2 for an explanation of each item.

[2]This information not available options 760-1034.

[3]Not entered for options 761-1034 because of differences in coding methods used by the data source and the author.

EXHIBIT 1 (continued)

Card 2

Item	Punched Card Column Numbers Used
Option Writer	1-3
Expiration Date	13-16
Stock	18-20
Trade Date	22-25
Type Option	27
Market Price of stock when action taken or market price on expiration date if 1 side of option exercised early	57-63
Dividends through date action taken or through expiration date	65-68
Difference between call and put striking price if spread	70-73
Option Identification Number	75-78
The number 2, representing card 2	80

EXHIBIT 2

DATA CODING

Option Writers:	Each writer is assigned a unique identification number.
Premium:	Gross premium received by writer.
Expiration Date:	See Exhibit 3.
Stocks:	Each stock is assigned a unique identification number (see Exhibit 4).
Trade Date:	See Exhibit 3.
Type Option:	1 = Call 2 = Put 3 = Straddle 4 = Strip 5 = Strap 6 = Spread
Striking Price:	Price at which option can be exercised.
Market Price[1]:	Market price of stock on date option written.
Option Dealer:	Dealer who handled option sale.
Option Endorser:	Brokerage firm guaranteeing writer will fulfill option contract.
Action Taken:	0 = called 1 = put 2 = expired 3 = both ends of straddle exercised 4 = 2 puts on strip exercised 5 = 2 calls on strap exercised 6 = both ends of spread exercised 7 = option extended 8 = all parts of strip exercised 9 = all parts of strap exercised
Date Option Exercised:	See Exhibit 3.
Market Price on Date Option Exercised[1]:	The market price of the stock on date option is exercised.

[1]If actual price not given in data, high-low average for day, rounded to the higher eighth if necessary, was used.

EXHIBIT 2 (continued)

Dividend/Share[2]:	Dividends paid during period option is outstanding.
Option Identification Number:	A number assigned to each option as its data was coded. Numbers 761-1034 were formed by adding 760 to the transaction number assigned by the data source.
Difference Between Call and Put Striking Price if Spread:	Call striking price less put striking price.

[2]Stock dividends are evaluated at the market price of the stock on the date of exercise (or expiration) and added to the cash dividend.

EXHIBIT 3

DATE CODING

Because the author thought others may desire to code historical option data going back to the early 1950's and late 1940's, a numbering code beginning in 1945 was used.

December 31, 1945, is equivalent to day 365

December 31, 1946, is equivalent to day 730

3/31/60 = 5569
4/30 = 5599
5/31 = 5630
6/30 = 5660
7/31 = 5691
8/31 = 5722
9/30 = 5752
10/31 = 5783
11/30 = 5813
12/31 = 5844
1/31/61 = 5875
2/28 = 5903
3/31 = 5934
4/30 = 5964
5/31 = 5995
6/30 = 6025
7/31 = 6056
8/31 = 6087
9/30 = 6117
10/31 = 6148
11/30 = 6178
12/31 = 6209
1/31/62 = 6240

EXHIBIT 4

Stock Code Numbers

Stock I.D. Number		Value Line Investment Quality Rating
1.	Abbott Lab	B
2.	ACF Wrigley	B
3.	Addressograph	A-
4.	Aerojet General	
5.	Allegheny Ludlum	C+
6.	Allied Chemical	B+
7.	Aluminium Ltd.	B-
8.	Amerada	B
9.	American Airlines	B
10.	American Bosch	B-
11.	American Hospital Supply	
12.	American Machine and Foundry	B+
13.	American Marietta	A
14.	American Metals Climax	B
15.	American Motors	C
16.	American Optical	B
17.	American Photocopy	
18.	American Telephone	A+
19.	American Viscose	C+
20.	Ampex	A-
21.	Anaconda	B-
22.	Arkansas-Louisiana Gas	A
23.	Armco Steel	B
24.	Armour	C+
25.	Armstrong Cork	B+
26.	Atlantic Refining	B-
27.	Automatic Canteen of American	B
28.	Avco	C+
29.	Baird Atomic	

EXHIBIT 4, Continued

Stock I.D. Number		Value Line Investment Quality Rating
30.	Barnes Engineering Co.	
31.	The Bullard Mfg. Co.	C-
32.	Bell and Howell	B+
33.	Bell Intercontinental	
34.	Bethlehem Steel	B
35.	Bliss, E.W.	C+
36.	Boeing	C+
37.	Borg-Warner	B
38.	Bristol-Myers	B+
39.	Brunswick	B
40.	Burlington Industries	C+
41.	Burroughs	B-
42.	U.S. Pipe and Foundry	B
43.	New York Central	C+
44.	Calumet and Hecla	
45.	Carter Products	B-
46.	Caterpillar	B
47.	Celanese	C+
48.	Cenco Instruments	
49.	Certain-teed Prod. Corp.	
50.	Champion Spark Plug	
51.	Champlin Oil	B
52.	Chance Vought	
53.	Chesapeake and Ohio	B+
54.	Chicago Pneumatic Tool	B+
55.	Chock Full of Nuts	
56.	Chrysler	C+
57.	Colgate	B+

EXHIBIT 4, continued

Stock I.D. Number		Value Line Investment Quality Rating
58.	Collins Radio	C+
59.	Columbia Broad. Sys.	B+
60.	Combustion Eng.	B
61.	Continental Steel	
62.	Copeland Refrig.	
63.	Corn Products	A
64.	Crowell Collier	B-
65.	Crown Cork	C+
66.	Curtis Prod. Co.	C+
67.	Davega	
68.	Daystrom	B-
69.	Decca Rcds.	B
70.	Deere	B
71.	Delta Airlines	B-
72.	Diamond Alkali	B
73.	Dome Mines	B-
74.	Douglas Aircraft	B-
75.	Draper	C+
76.	Dresser Ind.	B
77.	Du Bois	B+
78.	Eagle - Picher	B
79.	Eastern Airlines	B
80.	Eastern Stainless Steel Corp.	C+
81.	Eastman Kodak	A
82.	Electro Instruments	
83.	Electronic Specialties	
84.	Emery Air Freight Corp.	
85.	Eversharp Inc.	
86.	Excello	B+
87.	Ferro Corp.	C+

EXHIBIT 4, continued

Stock I.D. Number		Value Line Investment Quality Rating
88.	Fifth Ave. Coach Lines	
89.	First Charter Finance	B+
90.	First National Stores	A-
91.	Florida Power and Light	A
92.	Food Fair	B+
93.	Foote Mineral Co.	C+
94.	Ford	B
95.	Foster Wheeler	C
96.	Freeport Sulphur	B
97.	Garrett	B-
98.	General Dynamics	B+
99.	General Electric	A
100.	Gen. Instruments	C+
101.	General Mills	B+
102.	General Motors	B+
103.	General Precision Equip.	C+
104.	General Telephone and Electronics	A
105.	General Time	C+
106.	General Tire	B-
107.	Glen Alden	
108.	Goodrich	B
109.	Grand Union	A
110.	Grant W.T.	B+
111.	Great Northern Iron Ore	B
112.	Greyhound	B+
113.	Grumman Aircraft	C+
114.	Gulf Oil	A-
115.	Gusten Bacon	
116.	Harris-Intertype	B

EXHIBIT 4, continued

Stock I.D. Number		Value Line Investment Quality Rating
117.	Heli-Coil	
118.	Hercules Powder	B+
119.	Hertz	B+
120.	Heyden Newport Chemical Corp.	
121.	Howe Sound	C+
122.	Hydrometals	
123.	Ingersoll Rand	B+
124.	Interchemical	B
125.	International Harvester	B
126.	International Minerals and Chemicals	A+
127.	International Paper	A-
128.	International Resistance Co.	C+
129.	International Salt	B+
130.	International Telephone	B
131.	Ionics	
132.	Jones and Laughlin	B
133.	Joy Mfg.	B-
134.	Kaiser Roth	
135.	Kerr-McGee	B
136.	Korvette	
137.	Lear	C
138.	Leesona	
139.	Lehigh Portland Cement	B
140.	Lockheed	B-
141.	Lorillard	B+
142.	Lukens Steel	B-
143.	Lily Tulip Cup	
144.	MSL Industries	

EXHIBIT 4, continued

Stock I.D. Number		Value Line Investment Quality Rating
145.	Magma Copper	C
146.	Massey Ferguson	C+
147.	Marquardt Corp.	
148.	Marshall Field	B+
149.	Martin	B-
150.	Martin w i	B-
151.	McDonnell Aircraft	C+
152.	Merck	B+
153.	Metro Goldwyn-Mayer	B-
154.	Minneapolis-Honeywell	A-
155.	Minnesota Mining and Mfg.	A
156.	Minute Maid	
157.	Mission Development	B-
158.	Mississippi River Fuel	A-
159.	Monsanto	B+
160.	Montgomery Ward	B
161.	Motorola	B
162.	Newmont Mining	B
163.	North American Aviation	B
164.	Northern Natural Gas Co.	B+
165.	Northwest Airlines	C+
166.	*	B
167.	Olin Matheison	B-
168.	Otis Elevator	B+
169.	Outboard Marine Corp.	B+
170.	*	B-
171.	Pan American	B-
172.	Panhandle	B+

* Number has not been assigned to a stock

EXHIBIT 4, continued

Stock I.D. Number		Value Line Investment Quality Rating
173.	Park Davis	B+
174.	Pepsi Cola	B+
175.	Pfizer and Co.	B+
176.	Philco	C+
177.	Piper Aircraft	B
178.	Pittsburgh Plate Glass	B-
179.	Polaroid Co.	A
180.	Pure Oil	B
181.	Radiation	
182.	Radio Corp. of Amer.	B+
183.	Raymond Int. Inc.	
184.	Raytheon	C+
185.	Republic Steel	B
186.	Revlon	B+
187.	Reynolds Metals	B
188.	Reynolds Tobacco	A
189.	Rohr	C+
190.	Ronson	C+
191.	Ryder System	
192.	San Diego Imp.	
193.	Schenley	C+
194.	Schering Corp.	B
195.	Searle, G.D.	B+
196.	Seeburg Corp.	
197.	Skelly Oil	B
198.	Smith, A.O.	B+

EXHIBIT 4, continued

Stock I.D Number		Value Line Investment Quality Rating
199.	Smith Corona	C+
200.	Smith, Kline and French Lab.	A
201.	Southern Pacific	B
202.	Spence Chemical	B
203.	Sperry Rand	B-
204.	Spiegel Inc.	B-
205.	Standard Kollsman Inc.	C+
206.	Standard Oil of N.J.	B+
207.	Standard Packaging	B
208.	Stanley Warner	B
209.	St. Regis Paper	B-
210.	Swift	B
211.	Syntex Corp.	C+
212.	TXL Oil Corp.	B-
213.	Tallon, Inc., Class A	
214.	Tallen, Inc., Class B	
215.	Telectro	
216.	Texaco	A-
217.	Texaco wi	A-
218.	Texas Gulf Producing	B-
219.	Texas Inst.	A-
220.	Texas Pacific Coal and Oil	B-
221.	Textron	B-
222.	Textron wts	B-
223.	Thiokol	B-
224.	Transition	
225.	Twentieth Cen. Fox	B-
226.	Union Carbide	A-
227.	United Air Lines	B-
228.	United Fruit	C+

EXHIBIT 4, continued

Stock I.D. Number		Value Line Investment Quality Rating
229.	U.S. Foil B	B
230.	U.S. Rubber	B
231.	U.S. Smelting	C
232.	U.S. Steel	B+
233.	United Whelan	B-
234.	Universal Match	
235.	Vendo	
236.	Victorum	
237.	Warner Lambert	B+
238.	Westinghouse	B+
239.	Wilson Co.	B-
240.	Zenith	B
241.	Freuhauf Trailers	C+
242.	Studebaker-Packard	C-
243.	U.S. Tobacco Co.	B+
244.	American Cyanimid Co.	B+
245.	FFI Financial Federation	B+
246.	International Shoe	B+
247.	Ranco Inc.	
248.	Bendix Aviation Corp.	B+
249.	Diamond National	B-
250.	Tractor Supply	
251.	Goodyear Tire and Rubber	A-
252.	Scott Paper	A-
253.	Standard Oil of Indiana	B

EXHIBIT 5

OPTION DEALER AND ENDORSER CODES

Option Dealer Codes

The same code numbers were used for two dealers where indicated.

Code Number			
1	Thomas, Habbs and Botts		
2	Lerner		
3	Filer, Schmidt		
4	Cohn, Ivers		Option Number
5	Blair	Alan:	328,329
6	Goodnick	duPont:	346,347
7	Karp	Antin:	186,500,611
8	Unknown	Ezra:	128,133,509,607,707
9	Krinski	Goodbody:	256

Option Endorser Codes

Code Number	
1	Goodbody
2	duPont
3	Golkin and Bomback
4	Thompson, Mckinnen
5	Bache
6	Hayden Stone
7	Sutral
8	Unknown

NOTE: DEALERS AND ENDORSERS HAVE BEEN IDENTIFIED ONLY ON OPTIONS NUMBERED 1-760.

EXHIBIT 6

EVENTS DETECTED BY THE DATA ERROR CHECK PROGRAM

The following events are detected by the error check program. Their occurrence indicates the situation is sufficiently unusual to warrant investigation. An error is not necessarily present.

(1) An option writer number has been used which is impossible.

(2) The premium is greater than 20% of the option price.

(3) The premium is less than 5% of the option price.

(4) The trade date is later than or equal to the expiration date.

(5) The date action is taken is later than the expiration date.

(6) The trade date is later than the date action is taken.

(7) An incorrect number is used to identify a stock.

(8) The indicated option tape does not exist.

(9) The option gain is greater than two thirds of the option price.

(10) The dividend is greater than $10.

(11) The dividend is greater than or equal to 5% of the option price.

(12) A card is out of sequence.

(13) A card is a duplicate.

(14) A call was exercised when the market price was less than the option price.

(15) A call was exercised when the market price was equal to the option price but no dividend was paid.

(16) On the basis of the option type indicated, the action taken was impossible.

(17) The date action was taken was specified when the option expired.

(18) The market price was greater than or equal to the option striking price when a put was exercised.

(19) An unusual expiration has occurred.

(20) The difference between the option striking price and the market price is greater than $.50.

(21) The option duration is greater than 197 days.

(22) The option duration is less than or equal to 30 days.

(23) There is a missing identification number.

(24) An identification number has been omitted.

(25) A price is not in eighths.

(26) The option duration is unusual.

EXHIBIT 7

SAMPLE ØUTPUT FRØM ØPTIØN DATA ERRØR CHECK ANALYSIS

PREMIUM GREATER THAN .2 ØPTIØN PRICE TRANSACTIØN	2	001
CHECK ØPTIØN DURATIØN ØN TRANSACTIØN	3	002
CALL EXER. WHEN MKT. BELØW ØPT. PRICE TRANSAC.	7	005
DIFF. ØPTIØN AND MKT. PRICE GREATER THAN $.5	12	006
CHECK ØPTIØN DURATIØN ØN TRANSACTIØN	12	007
PREMIUM LESS THAN .05 ØPTIØN PRICE TRANSACTIØN	21	008
THIS TRANSACTIØN HAS BEEN ØMITTED	22	010
ØPTIØN EXTENDED ØN TRANSACTIØN	29	011
THIS TRANSACTIØN HAS BEEN ØMITTED	37	014
DIFF. ØPTIØN AND MKT. PRICE GREATER THAN $.5	50	016
UNUSUAL EXPIRATIØN ØN TRANSACTIØN	66	019
DIFF. ØPTIØN AND MKT. PRICE GREATER THAN $.5	67	022
CHECK ØPTIØN DURATIØN ØN TRANSACTIØN	69	023
CHECK ØPTIØN DURATIØN ØN TRANSACTIØN	73	024
DIFF. ØPTIØN AND MKT. PRICE GREATER THAN $.5	86	025
PREMIUM LESS THAN .05 ØPTIØN PRICE TRANSACTIØN	98	026
DIFF. ØPTIØN AND MKT. PRICE GREATER THAN $.5	98	027
CHECK ØPTIØN DURATIØN ØN TRANSACTIØN	98	028
DIFF. ØPTIØN AND MKT. PRICE GREATER THAN $.5	103	029
UNUSUAL EXPIRATIØN ØN TRANSACTIØN	105	030
CHECK ØPTIØN DURATIØN ØN TRANSACTIØN	108	031
PREMIUM LESS THAN .05 ØPTIØN PRICE TRANSACTIØN	112	032
UNUSUAL EXPIRATIØN ØN TRANSACTIØN	113	033
THIS TRANSACTIØN HAS BEEN ØMITTED	128	034
DIV. GREATER THAN/=.05 ØF ØPT. PRICE ØN TRANSAC.	130	035
DIFF. ØPTIØN AND MKT. PRICE GREATER THAN $.5	138	036

CHAPTER III

MEASURING PROFITABILITY

The Method Used

A number of interdependent problems arise in comparing the profits earned on investments of unequal duration. Calculations adjusting returns on these investments to a common duration make implicit assumptions regarding the way capital devoted to shorter lived investments is reinvested. These assumptions may cause the profit measure derived to be entirely distorted.

No adjustment for the length of time capital is invested would be necessary if it could be assumed that the return on an investment is independent of duration. Such an assumption is not true, as will be shown in Chapter 4[1], for the investments made by the put and call option writers studied. Therefore, differences in investment duration cannot be adjusted by any method to yield an accurate measure of profitability.

The problem is even more complicated, however, since it is necessary to have proportionately more capital tied up in longer, as opposed to shorter, duration investments.[2] Should an imprecise measure of profitability be given a fine adjustment by weighting

---

[1]See page 54.

[2]For example, if an option writer sells 300 one-month and 300 six-month options in one year at the rate of 25 of each kind per month, at any time after six months have transpired, 150 six-month and 25 one-month options are outstanding.

for this factor? Shall a further adjustment be made to differentially weight investments of different magnitude? The author has decided not to make these adjustments to the main measure of option writing profitability used in this study. However, these adjustments have been made when other methods of calculating profitability were used. These methods are outlined below. The measures of profitability calculated with these other methods can be used in further work evaluating the distortions introduced by the various types of correction factors applied.

The main measure of profitability used in this study is average rate of return per option contract sold. As indicated earlier, this measure of profitability makes the assumption that outcome is independent of duration. While this assumption is not true for the put and call options studied, this measure of profitability always yields an average rate of return figure which has the proper sign, i.e., negative if money was lost on the investment activity and positive if a profit was made--something that cannot be said for the other measures considered.

This measure has the additional advantage of assuming arithmetic averaging. This assumption is appropriate, since the option writers considered in this study are devoting only part of their capital to option writing.

Other Methods Considered

The other methods of calculating profitability considered annualize the returns on individual investments by assuming gains are compounded.

One method suggested by A. James Boness[3] is akin to the use of a geometric average. A geometric average is only appropriate, however, if all the capital utilized in the investment activity is necessary for each succeeding investment. Option writing does not necessarily require the investment of one's entire capital in each option contract sold.

Boness first investigates the use of a geometric average in the strictest sense. If R is the return on an investment, then

$$1 + R = e^{rt} \tag{1}$$

where

e = natural logarithm base
r = instantaneous rate of return
t = duration of the investment in days

A continuous rate of return can now be found by calculating

$$\ln(1+R) = rt \tag{2}$$

which becomes

$$\frac{365}{t} \ln(1+R) = 365r, \text{ if annualized.} \tag{3}$$

The average rate of return per investment is

$$\frac{\sum_{i=1}^{n} \ln(1+R)}{n}$$, which is the definition of a geometric average.

This measure of profitability will always yield a lower rate of return than an average of dollar gains. This return is lower because of the symmetric nature of the distribution of geometric gains relative to the distribution of dollar gains which is skewed to the right.

---

[3] In a forthcoming paper, "Some Evidence on the Profitability of Trading in Puts and Calls".

Boness discards the geometric average, however, because of the likelihood of losses greater than 100 percent of one's initial capital occurring when put and call options are margined.[4] Since the logarithm of a negative number is undefined, the geometric average can no longer be used.

To allow a rate of return of less than -100 percent to occur, Boness modifies equation (3) for negative R, as follows:

$$\frac{-365}{t} \ln(1+|R|) = 365r.$$

The gain distribution for this formulation of the rate of return calculation is believed to fall between the distribution of geometric gains and the distribution of dollar gains.[5]

Annualizing a negative rate of return in the above manner implicitly assumes that additional capital is being added to the original investment at the rate of loss that occurs on the investment over its initial duration. While this method of calculation circumvents the problem of not being able to lose more than 100 percent of one's capital, the assumption of additional capital being added to the investment introduces a negative distortion in the rate of return measure.

The author has investigated a method of calculating profitability analogous to the Boness rate of return measure. This method simply

---

[4]Assume, for example, that a put on Texas Instruments is sold at a striking price of $200 and the option writer covers with 25% margin equal to $50. If the stock falls to $140, the writer will lose his $50 investment and $10 in addition.

[5]This has not been verified on a theoretical basis.

applies the standard compound interest formula for all values of $R \geq -1$. Thus,

$$(1+R') = (1+R)^{365/D} \quad \text{and} \quad R' = (1+R)^{365/D} - 1$$

where

R = rate of return on the investment
D = duration of the investment
R' = annual rate of return

The convention for $R < -1$ the author has adopted is to consider rate of loss equal to the total loss divided by the original investment. Negative distortion is not introduced with this measure.

The objection against this method of calculating an annual rate of return is that the returns are being distorted in a positive direction. For example, if two equal four-month investments were made, one yielding -100 percent and the other +100 percent, the net return to the investor is zero. However, the simple compounding formulation of the annual return calculation would say that the annual rate of gain on the first investment is -100 percent and +700 percent on the second, for an average return of +300 percent. Such a return is not entirely implausible, however, when one considers the nature of compound interest. If the investment yielding +100 percent in four months is made for two more four-month periods, the return also being reinvested, the average return for the two investments is +300 percent. Naturally, the question is whether these investments for the two additional four-month periods can be made. Assuming that they can introduces a distortion in the positive direction into the average annual rate of return calculation. It should be noted that the modified geometric average method previously discussed also

produces this positive distortion, the net distortion being a function of the number of positive and negative returns and their duration.

Rates of return on individual investments and the over-all investment activity have been calculated using the Boness formulation of the geometric average and the simple compound interest method. Over-all profitability using these procedures has also been calculated by weighting individual annual returns by duration and investment, and by duration alone. These measures are defined on page 66.

Two other statistical measures were calculated to reflect the nature of the profitability distributions. Standard deviation and skewness were found for the distributions of the modified geometric rate of return as formulated by Boness, the simple compound interest rate of return, and for the distribution of dollar gains per option contract sold. These statistical measures tell the relative dispersion of the returns around the mean and to what extent the distribution is skewed relative to other skewed distributions. If

X_i = rate of return on each individual investment,

then the standard deviation of the rates of return

$$\sigma = \sqrt{\Sigma(x_1-\bar{x})^2/n-1}$$

where

n = the number of rates of return in the sample.

The skewness of the distribution

$$= \frac{\Sigma(X_i-\bar{X})^3/n}{\sigma^3}$$

One other method of evaluating profitability of option writers has been used which simply involves comparing the actual dollar return

per option contract written to the opportunity cost per contract writing opportunity. This procedure provides an excellent comparative measure of profitability and eliminates the difficulties found in calculating an absolute measure of profitability where the necessity of taking a weighted average creates distortions.

Gross Profit Calculation

The following discussion will show how the gross profit on a writer's investment, which hedges or margins an option contract, is calculated.

Gross profit is a function of

(1) the percentage of the premium retained by the put and call writer,

(2) whether an option was hedged or margined,

(3) the price movement of the stock optioned,

(4) the dividends declared during the period the option was outstanding, and

(5) the relationship between the option striking price and the market price of the stock at the time the option was written.

If an option writer has an agent who provides the writer with advice, provides bookkeeping functions, and maintains contact with option dealers, the agent usually retains part of the premium received by the writer. The larger the percentage of the premium retained by the agent, the lower the profit of the option writer.

If an option is margined, the writer loses nothing from the price movement of stock adverse to the holder of such an option.

Similarly, he has a loss to the extent the price movement is favorable to the holder of such an option. Just the opposite is true if the option sale is hedged. If a price movement of the stock optioned is unfavorable to the option holder, it is just as unfavorable to the option writer. If an option is hedged and a favorable price movement for the option holder occurs, the option writer suffers no loss.

The above statements are modified to the extent that the striking price of the option is different from the market price of the stock at the time the option is written. Thus if the striking price is slightly above the market price at the time a hedged call option is written and the option is exercised, the writer adds that small difference to his profit. If, on the other hand, he margined the sale of the call contract, his loss is reduced by that small difference.

The writer's profit picture with a put contract is analogous. If a put option is hedged, written at a price slightly above the market, and ultimately exercised, the writer loses the small difference between striking and market price. If the option was margined, he loses this small difference plus the amount of the price movement favorable to the option holder. If, on the other hand, the put option striking price is less than the market price, the writer gains the difference when hedged and does not lose the difference when margined.

Dividends paid during the period the option is outstanding affect the option writer as follows: The striking price specified in an option contract is reduced by the amount of the dividends paid from the time the option is written to the time the option is exercised.

On a call, therefore, if the writer hedges and the call is exercised, the writer is not affected. He receives dividends due to stock ownership which he in turn gives to the option holder through a reduced striking price. If the writer had margined a call contract which is exercised, he loses the amount of the dividends paid on the stock in addition to the loss due to the adverse price movement of the stock.

If the call contract had expired, the writer would have gained the dividends paid if he had hedged. If he had margined the contract, the dividends would not have affected him at all.

Example of Gross Profit Calculation

The following example should demonstrate the various aspects of the gross profit calculation just described:

A six-month straddle is written on a stock selling at $50 per share, for which the writer receives a gross premium of $850. The option striking price is $51, and the writer keeps 90 percent of the option premium, 10 percent going to his agent. After three months the stock falls in price to $40 and the put side of the option is exercised. During the remaining three months of the option contract during which the call side of the option is still outstanding, the stock continues to fall in price and sells at $35 on the day the call side of the option expires. During the first three months the option was outstanding, a dividend of 30 cents per share was paid. A dividend of 60 cents per share was paid during the last three months the option was outstanding.

If the option writer had hedged the call side of the straddle, his

$$\text{Gross Profit} = .9(850) - 100(51-40) - 100(50-35) + 100(.30) + 100(.90) = \$-1715$$

The writer would keep 90 percent of the premium, lose the amount the price of the stock fell from the striking price until the put side of the straddle was exercised, lose the amount the price of the stock fell from the original market price until the call side of the straddle expired, gain the dividend paid on the stock which was put (since the striking price was reduced by this amount) and gain the dividend paid on the stock he held (since the stock was not called from him).

If the option writer had margined both sides of the straddle, his loses would have been reduced by $1,500, since he would not have suffered the loss on the stock used to hedge the call side of the straddle. However, he would not have received the $90 in dividends paid on the stock during the time the call side of the straddle was outstanding.

The Required Investment

The investment required for each option contract sale is based on the hedge or margin requirements assumed. When margining assumptions are made, the minimum margin requirements allowed by the New York Stock Exchange are used. These margin requirements are 30 percent for a call and 25 percent for a put. It is also assumed that the margin rate effective on stock purchases and sales is 70 percent throughout the period under consideration, April, 1960, to February,

1962.[6]

If a put or call is sold, the applicable hedge or margin rate is used in calculating the investment required. If a straddle is sold where puts and calls are margined, New York Stock Exchange regulations specify that the larger of the minimum margins that would be required to write either a put or a call option separately is the minimum required coverage for the sale of the straddle. This minimum coverage is the call margin equal to 30 percent of the market price. If either side of the straddle were to be hedged, however, the New York Stock Exchange requires additional minimum margining (or hedging) of the other side of the straddle. Similar reasoning applies to the investment required for the sale of a strip or a strap under margining assumptions. Assuming 70 percent hedging, with calls hedged, the investment for a strap would be 165 percent of the market price; for puts and calls margined, 60 percent, and for puts hedged, 130 percent.

The actual cash investment required of the option writer is arrived at by deducting the premium retained by the writer from the total investment required, as calculated under the hedging assumptions made. The use of the premium money in this manner is a method of assigning its use a value. The method is alternative to assuming that the total investment is made from the writer's stock of cash, the premium received earning interest for the option duration. The

---

[6]The margin rate actually in effect through July 28, 1960, was 90 percent. The effective rate from July 29, 1960, to January 30, 1962, was 70 percent. Source: "Federal Reserve Bulletin", April, 1962.

method used eliminates the need for establishing the appropriate interest rate at which premium money received is invested.

Costs Associated with the Writing, Exercise, or Expiration of an Options Contract

Aside from the possible costs associated with stock price movements and dividends paid on the stock during the period the option is outstanding, the following costs are, or can be incurred:[7]

1. Commissions: If a call or the call side of an option is hedged, a commission cost is charged the writer.[8] If the stock is then called from the writer, a second commission is charged. If the stock is margined and then called, the writer is charged with two commissions when the stock is called. When a put is sold, a commission is charged if the option is hedged. If the stock is not hedged and the stock is subsequently put to the writer, no commission charge or transfer taxes are levied on the option writer. Similarly, no commission or transfer taxes are charged when the hedged call side of an option expires.[9] The writer feels that the decision whether to sell stock once acquisition has been forced or a hedged call option expires is no longer a problem associated with option writing prof-

---

[7]The endorsement fee of $6.25 which the endorsing brokerage house usually collects has already been deducted in arriving at the gross premium received by the option writer.

[8]While many option writers owned the stock they used to hedge a call, an acquisition commission was charged in all cases, since ownership information was not available on options 760-1034.

[9]The same holds true for hedging a put. The short sale is assumed transferred to the writer's investment portfolio.

itability, but rather an investment decision: Is the potential value of another investment sufficient to overcome the cost of liquidating the present investment and making the new one? Therefore put stock and uncalled stock acquired to hedge an option are assumed transferred to the writer's investment portfolio. The schedule of brokerage fees applicable to stock sold on the New York and American Stock Exchanges is shown in Table 2.

2. Interest Charges: These charges are levied in all cases where stock purchased or sold short to hedge is margined. An interest expense equal to 6 percent of the position margined is charged the option writer for the period the option is outstanding. The rate charged is about 1 1/2 percent above the prime rate in effect during the period studied and about equal to the average short term business loan rate in effect during the period.[10]

3. Transfer Taxes: The option writer is charged with these taxes whenever he sells stock, i.e., when stock is called from him or when he hedges a put. The Federal and New York State schedules applicable are shown in Table 3.

Computing Profitability

A computer program was written to calculate the writer profit associated with individual option contracts and to calculate the over-all profitability of the writing activity. This program, shown in Appendix 4 , incorporates the concepts and methodology described

---

[10]Federal Reserve Bank of New York "Monthly Review", April, 1962.

on the preceding pages.

The program processes the option data as follows:

Punched cards containing the data describing each option contract are read into the computer. The investment required of the option writer and the costs associated with the sale of the contract and its outcome are calculated. Net profit per option contract sold is found by subtracting the option writing costs from gross profit. Rates of profit are then calculated on each individual investment. After all the option data is processed, over-all profitability and the standard deviation and skewness of various profit distributions, described earlier, are computed.

The program allows profitability calculations to be made under various strategies which the option writer is assumed to follow. These strategies will be discussed in the next chapter. To calculate profitability according to these different strategies, certain parameter values must be specified before computations begin. These parameters are:

(1) The portion of the option premium kept by the option writer.

(2) The strategy upon which the calculations are to be based.

(3) The call margin assumed.

(4) The put margin assumed.

The computer program was written to calculate the profitability of all types of option outcomes found in the data studied. Certain outcomes have not been allowed for in the program because the action

would be illogical[11], it did not occur in the data sample and would occur too rarely to make inclusion worthwhile, or all the relevant information could not be entered on the data cards using the present format.

The profit calculations for the exercise of one put side of a strip, one call side of a strap, or one call and one put on a strip or a strap, have not been included in the program. None of these events occur in the option sample studied.

The formulas in the profit program which calculate strip and strap profitability assume that if all sides of the option were exercised, the two puts or two calls were exercised at the same time. All sides of an option contract were not exercised in any of the strips or straps encountered in the data sample studied. If all sides of a strip or strap were exercised at different times, all the relevant information could not be entered on the data cards using the present format.

One final note concerning a small imperfection in the margin or hedge investment requirement calculated for a put should be made. The calculation in the program is based on the market price of the stock at the time the option is written, but should be based on the option striking price. Thus, when the striking price is above the market price[12], the put hedge or margin requirement calculated is

---

[11]The program will ignore an option with an unanticipated outcome indicating via a punched card it has done so.

[12]When this does occur, there is rarely more than a $1 spread.

too low, and too high when the striking price is less than the market price. This possible deficiency in the put or hedge coverage has no important consequences, however, when hedge or margin requirements of 100 percent or 70 percent are used, since these are more than satisfactory. When a 25 percent put margin is assumed to be used, however, the margin investment calculated is slightly insufficient when the striking price is above the market price of the stock. The rate of return calculated using the put margin as a base becomes slightly magnified.

TABLE 2

BROKERAGE FEES FOR BUYING OR SELLING STOCK
ON THE NEW YORK AND AMERICAN STOCK EXCHANGES

Purchase Price of 100 Shares of Stock	Commission
Below $100	$ 6
$ 100 - $ 399	$ 3 + 2.0% of purchase price
$ 399 - $2,399	$ 7 + 1.0%
$2,399 - $4,999	$19 + 0.05%
Greater than $4,999	$39 + 0.001%

TABLE 3

FEDERAL AND NEW YORK STATE TRANSFER TAXES

Federal Transfer Tax

Market Price of Stock	Tax
Less than $200 per share	$.05 per $100 market value of stock
Greater than $200 per share	$8 per 100 share

New York State Transfer Taxes

Market Price of Stock	Tax
Greater than $20 per share	$4 per 100 shares
$10.01 - $20	$3
$ 5.01 - $10	$2
$ .01 - $ 5	$1

CHAPTER IV

THE PROFITABILITY OF PUT AND CALL OPTION WRITING

Profitability of put and call option writing will be considered from a number of aspects. First, the actual profitability of option writing is calculated and contrasted with the profits option writers could have made by using other possible strategies. Then the profitability of each option writer is contrasted with his opportunity cost. Next investigated are characteristics which can be associated with all option contracts: duration, type, striking price, and outcome--all of which may influence or determine profitability. Finally, the relation between option writing profitability, option trade and expiration dates, and stock market price movements is investigated.

Five possible strategies for put and call option writing have been considered in this study.

Strategy 1: All calls and call sides of two-sided options[1] are hedged, and puts or put sides of two-sided options are margined. Both the call hedge and the put margin can equal 100 percent, or the call hedge can equal 70 percent and the put margin 25 percent. This strategy with both call hedge and put margin equal to 100 percent was used by the option writers considered in this study.

Strategy 2: All options are margined. The call margin can equal 30 percent and the put margin, 25 percent.

Strategy 3: Calls and call sides of two-sided options are margined and puts or put sides of two-sided options are hedged. Both

---

[1] Two-sided options are straddles, straps, strips, and spreads.

the call margin and the put hedge can equal 100 percent, or the call margin can equal 30 percent and the put margin, 70 percent.

Strategy 4: Same as Strategy 1, except that single calls and single puts are both hedged. If the call side of a two-sided option is hedged at 100 percent, then a put is hedged at 100 percent and the put side of a two-sided option is margined at 100 percent. However, if the call side is hedged at 70 percent, then a put would be hedged at 70 percent and the put side of an option margined at 25 percent.

Strategy 5: Same as Strategy 3, except that single calls and single puts are both hedged. If the put side of a two-sided option is hedged at 100 percent, then a call is hedged at 100 percent and the call side of a two-sided option is margined at 100 percent. However, if the put side is hedged at 70 percent, then a call would be hedged at 70 percent and the call side of an option margined at 30 percent.

All strategies assume the option writer kept 86.5 percent of the premium received on the sale of an option contract.[2] Strategy 1 with calls hedged and puts margined at 100 percent, the strategy used by the option writers considered in this study, was also evaluated assuming option writers kept 100 percent of the premium.

These five strategies have been chosen because they are the only "pure" strategies which seem feasible. Strategy 4 or Strategy 5 would be preferable to Strategies 1 or 3 if option buyers bought the

---

[2]The writers' agent, Denmar Corporation, kept 13.5 percent of the option premiums received.

options which writers sold[3] and if the buyers' expectations were correct. If many options were purchased for protection[4], Strategies 4 and 5 would probably not be effective.

"Pure" strategy here means a strategy where a certain hedge or margin position is taken to cover the option contract sale and is not changed while the option is outstanding. A mixed strategy is akin to the filter rule technique[5] Alexander has investigated. With a mixed strategy, all options would initially be margined. If an adverse price movement of a specified percent of the option striking price occurred, the option would now be hedged. If the price of the stock optioned then changed direction and an equivalent percent price change occurred, the option would be margined again. Some work done with mixed strategies[6] concludes they can be more profitable for the option writer than pure strategies. Mixed strategies have not been investigated here primarily because the option data on which this study is based did not have the necessary price range information.

---

[3]Dealers might convert options before sale.

[4]For example, a put option could be purchased to protect against a severe price decline in a stock owned by the option buyer. Any loss due to a drop in the price of the stock owned would be balanced by a gain on the put option. See Filer, op. cit., supra p. for a further discussion of the protection features associated with option buying.

[5]Alexander, Sidney S., "Price Movements in Speculative Markets: Trends or Random Walks", Industrial Management Review, May, 1961.

[6]Boness, op. cit., supra p. 31.

In addition, an entirely different data format and new profit program would be required.

The profit results for each different strategy with its variants of put and call hedging and margining are shown in Table 4.[7] Detailed profit results for each option studied, calculated under the strategy actually used by the option writers, are presented in Appendix 5. Under none of the strategies considered would it have been possible for the option writers as a group to make a profit except under the strategy actually used if the option writers had been able to keep the entire premium. Writers would have made an average profit of $52 per option contract sold as opposed to an $8 loss.

The average cost to the option writer for the services provided by his agent was $60 per option contract written.[8] These services include obtaining higher premiums than the writers could obtain acting independently, performing bookkeeping functions, and maintaining contact with option dealers. If these benefits provided by the option writers' agent are worth an average of $60 per option contract written, the option writers would have been no better off handling their option writing activities independently.

---

[7] Including options 681 to 750 in the data sample has raised the actual average gain per option contract sold from -$17 without inclusion to -$8. The average gain per option contract sold for options 681 to 750 was $93.

[8] Average dollar gain per option contract written under Strategy 1 with the option writer keeping 100 percent of the premium, less average dollar gain per option contract written under Strategy 1 with the option writer keeping 86.5 percent of the premium.

The distribution of dollar gains per option contract sold under the strategy actually used by the option writers is shown in Figure 1 . This distribution has a skewness value of -2.9. All the other strategies, except Strategy 2, have skewness values of the same magnitude. These dollar gain distributions are negatively skewed because gains are limited to the premiums received while losses are unlimited. The dollar gain distribution for Strategy 2 is not as negatively skewed at -1.7. This is because large double losses do not occur with margined straddles. When straddles are hedged, large price movements in the adverse direction[9] cause losses on both sides of the straddle.

Nothing especially significant can be said regarding the standard deviation of the distributions of dollar gain per option contract sold for the different strategies considered. The standard deviation for Strategy 2 is the lowest because the large double losses on straddles found with other strategies cannot occur.

On the basis of the evidence shown by the profitability results, Strategies 2, 3, 4, and 5 were not desirable alternatives to Strategy 1 for the specific option sample studied and over the specific time period investigated. Strategy 1, equivalent to selling only margined puts, was superior because the stock market had a predominantly upward trend over the option writing period considered. If there had been a predominantly downward trend in the stock market over the

---

[9]If the call side of the straddle is hedged, a drop in the price of the stock optioned is adverse. If the put side of the straddle is hedged, a rise in the price of the stock optioned is adverse.

option writing period considered, Strategy 3 would probably have been preferred to Strategy 1. This dependence on stock market movements suggests that in a period of selectivity in stock price advances, when the market itself is not moving up or down, Strategy 2 or a mixed strategy might yield the highest profit. A mixed strategy would probably be preferred to Strategy 2, since the mixed strategy would eliminate large losses from price movements favorable to the option buyer. The fact that Strategies 4 and 5 yield poorer results than Strategies 1 and 3 indicates that options sold by writers may be converted, option buyers' expectations are not correct, or option buyers have other motives such as protection for the purchase of put and call options.

It should be noted that minimum hedging and margining under Strategy 1 reduce the required investment[10] by 50 percent from the investment under 100 percent margining and hedging. An average cost per option contract sold equal to $28[11] is incurred for using this maximum leverage. However, if the writer's opportunity cost is greater than 6 percent, the interest rate charged on the amount margined, he will maximize his gain by following Strategy 1 using this maximum leverage.

---

[10]This refers to initial investment. If the price of the stock optioned moves adversely, relative to the writer's hedged or margined position, he will be required to invest additional "maintenance" margin.

[11]Dollar loss per option contract sold under Strategy 1 with maximum leverage (hedging calls 75 percent and margining puts 25 percent) less dollar loss per option contract sold under Strategy 1 hedging and margining at 100 percent.

It is somewhat doubtful, however, whether this maximum leverage can be applied with Strategy 1 and extremely doubtful whether it can be applied with Strategy 2. This is because brokerage houses probably will not allow option writers to use leverage unless they have other investments which act as additional protection in case the market moves adversely. This can be considered contingency capital which, while not directly invested in option writing, is necessary if leverage is to be obtained. This contingency capital can be invested in other financial securities. Since the option writers considered in this study do not use all their capital for option writing, they should have sufficient amounts invested in other types of financial securities to make some leveraging of option writing possible.

Option Writer Profitability

Table 5 presents the option writing profitability results for each of the 76 option writers considered in this study. Results are tabulated for option numbers 1 to 759 and for option numbers 1 to 1034. The last grouping reflects actual total profitability. The first grouping is used for analysis purposes, however, because information whether option writers owned or purchased the stock they used to hedge calls is available only for these options.

The writers' opportunity cost per option written has been calculated as the appropriate combination of the following:

(1) The gain or loss that occurred on the stock optioned over the period of the option if the writer used stock

he owned to hedge the sale of a call.[12]

(2) 5 percent[13] earned on the investment required to acquire stock if it was purchased to hedge a call.

(3) 5 percent earned on the investment required to margin the put side of an option.[14]

The computer program used to make these calculations is presented in Appendix 6.

The actual profit per option contract written on the 722 contracts covering options numbered 1 to 759 was -$3 per contract. The writer opportunity cost on these same contracts was $133 per option writing opportunity. On the 340 options where the writer hedged calls with stock he already owned, the average profit per contract written was $16 and the opportunity cost per option writing opportunity was $170.

Thirty of the 76 option writers wrote six or more options during the period studied. Eighteen of these 30 writers made a profit, one broke even, and eleven lost money. Of the eighteen who made a profit, sixteen had a higher opportunity cost per option writing opportunity

---

[12]Dividends paid should also have been added to this opportunity cost.

[13]It is assumed the option writer could have invested his money to earn 5 percent.

[14]This calculation, just as the program written to evaluate option writing profitability, assumes the market price rather than the option striking price determines the put margin requirement.

than their actual profit per option written.[15] The writer who broke even and ten of the eleven who lost money also would have done better by not writing options.

Thirty-two of the 46 option writers who sold five options or less made a profit and fourteen lost money. Seventeen of the 32 making a profit and ten of the fourteen suffering a loss had higher opportunity costs than profits per option contract sold.

Thus 50 of the 76 option writers studied made a profit, but 33 of them would have done better by not writing options. Twenty-two of the 26 individuals who lost money writing options would have made a profit or have lost less by not writing options.

Profitability and Option Duration

In Chapter III it was recognized that the average rate of return per option contract written is a distorted measure of profitability to the extent that outcome is a function of duration. The results for the option profitability calculations with options classified by duration are shown in Table 6. The correlation coefficient between average duration[16] and dollar gain per option contract written, +.70, is significant at the 10 percent level. This high correlation coefficient indicates that some distortion is present in this measure of profitability when applied to the investments made by the put and

---

[15] In Table 5 where individual writer profits are presented, actual profit per option written has been subtracted from opportunity cost per option written rather than the more standard reverse procedure. This was done because opportunity cost was usually greater than profit.

[16] Σ (date action taken--trade date)/number of options written.

call option writers studied.

It is important to note that this high correlation between outcome and duration means that the over-all estimate of profitability of -$8 per option contract sold or -.1 percent average rate of return per option contract sold is distorted in the negative direction. This negative distortion occurs because no six-month options written in the last six months of the period under consideration were included in this study. As indicated in Chapter II[17], a cut-off date was established beyond which no options included in the sample could expire.

The standard deviation of the distribution of dollar gains per option contract sold for a duration class, and the average duration for that class has a correlation coefficient of .54.[18] This correlation coefficient is not significant at the 10 percent level for the six observations made. Therefore the hypothesis that the standard deviation of dollar gains per option contract sold is independent of duration cannot be rejected. This result is surprising, since on an a priori basis, a definite relation between the two variables would be expected.

Profitability and Option Type

Results of the profitability calculations for options classified by option type are shown in Table 7. Puts and calls were profitable

---

[17] See p. 8.

[18] Gains on 21-day options have been eliminated because they are all identical, the distribution having a zero standard deviation.

for the option writer on the average, while money was lost on straddles. The better performance of puts and calls suggests option writers might do better by not writing straddles. If just margined puts and hedged calls were sold on different stocks, the writers would eliminate the possibility of large double losses occurring from a sizable drop in the price of a stock optioned. Selling puts and calls on different stocks is equivalent to diversifying to reduce risk. The sale of a straddle, using a puts-margined and calls-hedged strategy, is equivalent to selling two margined puts. Such a position offers no diversification at all.

It is interesting to note the positive correlation between outcome by option type and the skewness of the dollar gain distribution by option type. This relationship indicates that option types, when profitable, had more large gains than large losses. Similarly, when option types yielded losses, they had more large losses than large gains.

Profitability, Option Type, and Duration

The first table below shows profitability by option type and duration. The second table shows the number of option contracts sold in each option type-duration class.

While, on the average, money is lost on straddles and short duration options, straddles show an average profit only for 60-day options. Put and call option gains cause the relatively high profits found with long term options. Nothing else especially significant is noticeable from these results.

TABLE 8

AVERAGE PERCENT RATE OF RETURN PER OPTION CONTRACT SOLD

TYPE[19]	DURATION			
	30 days	60 days	90 days	6 months
CALL	0.5	-1.4	-1.3	2.8
PUT	-0.7	-1.4	0.7	4.3
STRADDLE	-2.1	0.5	-1.4	-0.9

TABLE 9

NUMBER OF OPTION CONTRACTS WRITTEN

TYPE	DURATION			
	30 days	60 days	90 days	6 months
CALL	3	59	100	162
PUT	7	11	31	26
STRADDLE	2	100	167	138

Profitability and Option Striking Price

The profit results for options classified by option striking price are shown in Table 10. Some positive correlation between option writing profitability and striking price seems to be present. This positive correlation between outcome and striking price indicates

---

[19]Strips, straps, and spreads have not been included because the number of occurrences of each of these option types is too small to provide meaningful information.

that writers will have greater profits by writing options on higher priced stocks. A regression of investment per option contract on a measure of stock quality, which will be discussed in Chapter V, corroborates this hypothesis.[20]

Profitability and Option Outcome

Table 11 presents the results for option contracts grouped by option outcome. Only on those options where stock was called did option writers make profits. Such profits were to be expected, however, since all calls were hedged. The largest losses were incurred where stock was put to the option writer and were mainly due to the double losses occurring on straddles. It is interesting to note that the premiums from expiring puts, straddles, and calls were not sufficient to offset the losses on stock held to hedge unexercised call options.

Option Writing Profitability Related to Option Trade and Expiration Dates and Stock Market Price Levels

To determine whether a relationship existed between the level of the stock market and option writing profitability, the options were grouped by trade and by expiration dates, by months, and processed through the option writing profit program. The results are shown in Table 12.

The Dow Jones Industrial Average, a widely used indicator of stock price levels, was regressed with option outcomes classified first by trade and then by expiration dates. A correlation coefficient

---

[20]Chapter V, p. 82.

significant at the 1 percent level, -.68, was found between outcomes grouped by trade date and the Dow Jones Average.[21] The average rate of return on option contracts written during a month is plotted with the Dow Jones time series in Figure 2 . The options which were written when the stock market was at its lowest levels were profitable for option writers, and those sold at its highest level were unprofitable. This relationship between profitability and trade date stock market price levels is due to the margining-puts and hedging-calls strategy used by the option writers.

A non-significant correlation coefficient of -.28 was found between the Dow Jones Average and outcomes grouped by expiration date. This low correlation coefficient probably occurred because each group contains options of different duration. In Chapter VI a significant positive correlation will be shown between the value of a portfolio of option contract sales and the level of the stock market as represented by the Dow Jones Average.

It should be noted that the option writers' agent began his activities just prior to the period studied, and his volume of option sales grew over the period. Therefore most of the options in the sample studied had trade dates around the middle and end of the period. Because options written at the beginning of the period were profitable for option writers, the total profitability of the option writing activity is understated relative to that which it would have

---

[21]The degrees of freedom used to evaluate the significance of the correlation coefficient have not been adjusted for possible auto-correlation of successive observations of the Dow Jones Average.

been with a constant rate of option sales over the period considered.

This is not meant to imply that poor profitability results were obtained because option sales were bunched during periods unprofitable for option writing. As indicated in Table 12, stock option sales were well distributed over the period, September, 1960, to October, 1961, with the largest sales volumes occurring during periods which yield practically a zero return, March and June, 1961.

Fig. 1

Distribution of Dollar Gains per Option Contract Sold

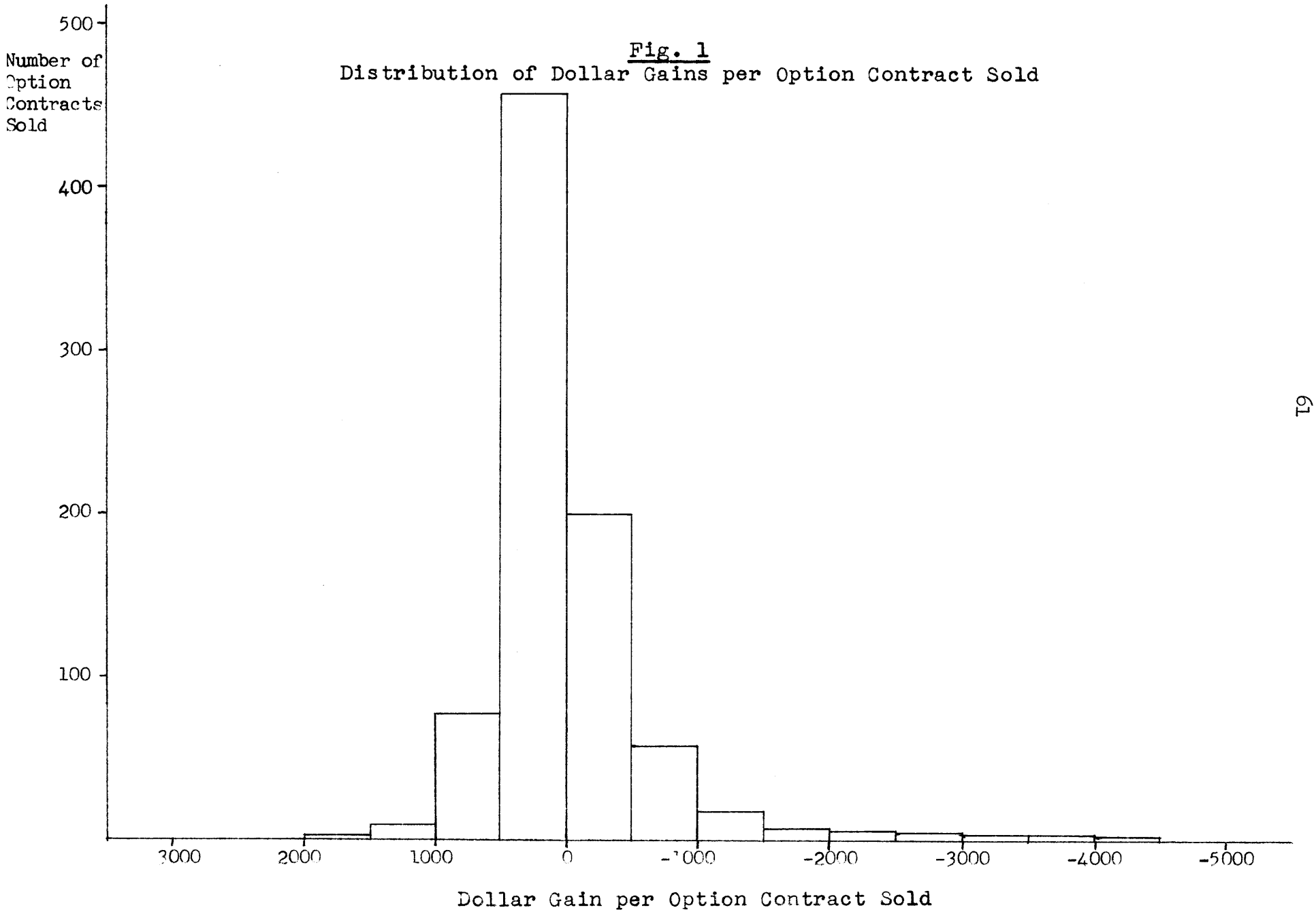


Fig. 2

Option Profitability as a Function of Trade Date

and the Dow Jones Industrial Average

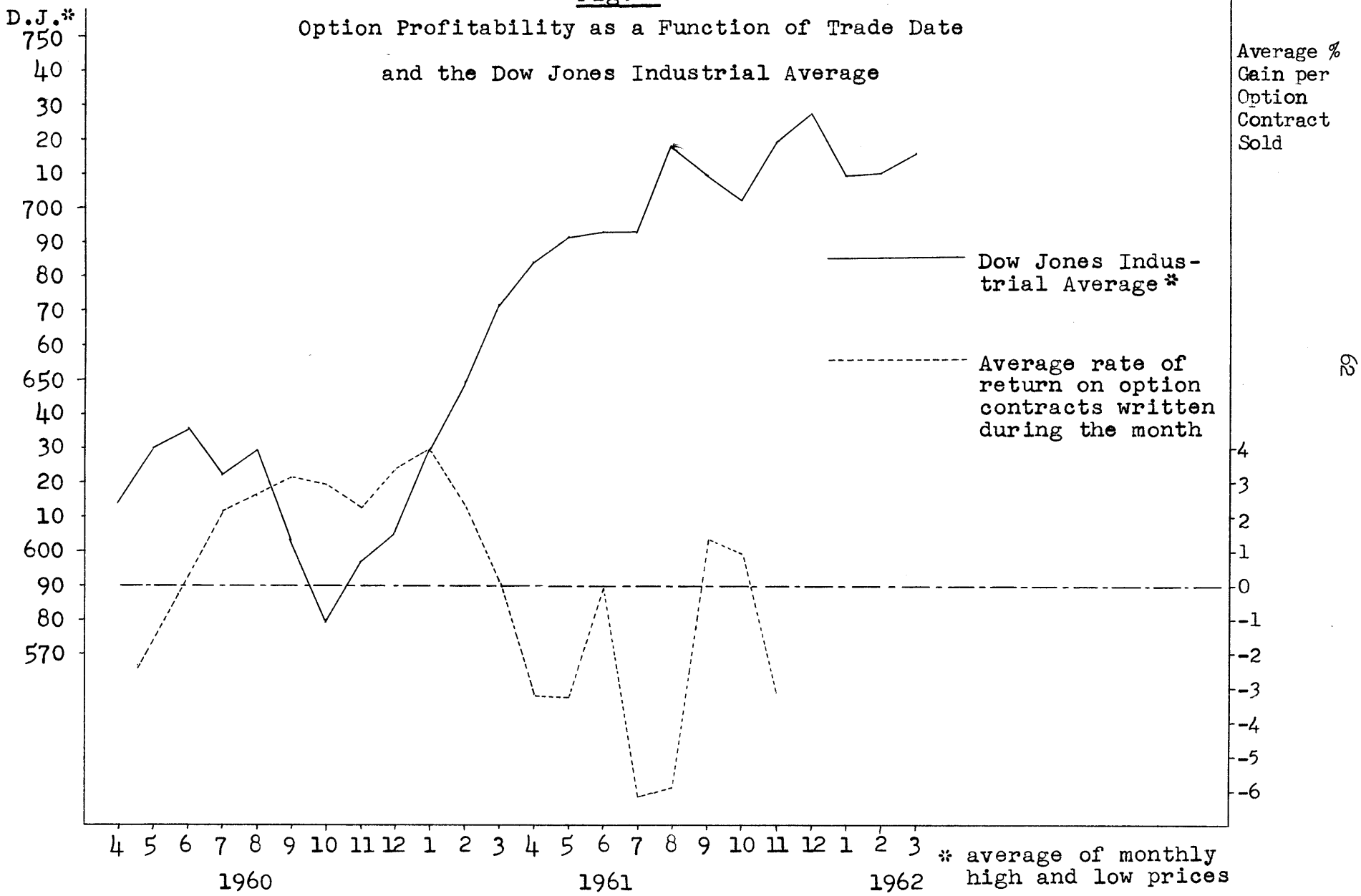


TABLE 4

PROFITABILITY OF PUT AND CALL OPTION WRITING UNDER DIFFERENT WRITER STRATEGIES

STRATEGIES[1]	(1)[2]	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1 100 100 86.5	-8	5971	-.1	622	-2.9	2.1	2.4	2.2	27.0	-.9	0.1	0.6	-1.1	32.6	-2.6	126	851
1 100 100 100	52	5911	.9	624	-2.6	5.2	5.9	6.2	28.1	-.5	3.0	3.7	2.8	31.5	-2.4	126	851
1 25 70 86.5	-36	2959	-1.2	619	-3.0	7.2	5.4	42.0	904.7	28.5	-1.6	-1.0	-5.6	81.6	-4.1	126	851
2 25 30 86.5	-95	894	-10.1	526	-1.7	36.7	88.9	77.7	998.6	26.9	-16.5	-19.6	-43.5	233.8	-4.9	126	851

[1]The first number indicates the strategy.
The second number indicates the put margin or hedge required.
The third number indicates the call margin or hedge required.
The fourth number indicates the percent of the premium kept by the option writer.

[2]See page 65 for explanation of column headings.

TABLE 4 (continued)

PROFITABILITY OF PUT AND CALL OPTION WRITING UNDER DIFFERENT WRITER STRATEGIES

STRATEGIES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
3 100 100 86.5	-179	5971	-3.0	873	-3.2	-4.0	-2.8	-3.8	35.8	-.7	-7.4	-6.8	-12.1	59.2	-4.2	126	851
3 70 30 86.5	-208	2506	-8.1	875	-3.2	-1.2	8.9	10.5	105.1	1.0	-17.1	-16.7	-36.5	209.2	-6.8	126	851
4 100 100 86.5	-21	5971	-3.5	639	-2.8	1.5	2.1	2.5	27.0	-1.0	-.4	.3	-.7	32.8	-3.0	126	851
4 70 70 86.5	-49	3139	-1.6	638	-2.9	3.8	4.0	5.4	43.6	--.5	-2.5	-1.8	-3.4	55.0	-2.4	126	851
5 100 100 86.5	-145	5971	-2.4	865	-3.6	-3.1	-.9	-1.3	31.7	-.8	-6.0	-3.6	-5.8	39.2	-2.3	126	851
5 70 70 86.5	-173	3247	-5.3	867	-3.6	-2.9	-.8	-.4	50.5	-.4	-11.7	-8.9	-12.9	66.9	-1.9	126	851

Column Key for Tables Describing Profitability Results[1]

Column 1	Average dollar gain per option contract sold (in dollars)
2	Average investment per option contract sold (in dollars)
3	Average return per option contract sold (column 1 ÷ column 2)
4	Standard deviation of dollar gain per option contract sold (in dollars)
5	Skewness of dollar gain per option contract sold
6	Investment and duration weighted average, compound interest method annual return (percent)
7	Duration weighted average, compound interest method annual return (percent)
8	Compound interest method average annual return (percent)
9	Standard deviation of compound interest method average annual return (percent)
10	Skewness of compound interest method average annual return
11	Investment and duration weighted average, continuously compounded annual return (percent)
12	Duration weighted average, continuously compounded annual return (percent)
13	Continuously compounded average annual return (percent)
14	Standard deviation of continuously compounded average annual return (percent)
15	Skewness of continuously compounded average annual return
16	Average duration of an option contract (in days)
17	Number of option contracts

[1] See page 66 for definition of profit measures used.

EXHIBIT 8

PROFIT MEASURES USED IN CALCULATING
OPTION WRITING PROFITABILITY

Definitions: t = option duration
n = number of option contracts
R = duration rate of return
R' = annual rate of return
e = natural logarithm base
r = instantaneous rate of return
I = investment
L = loss

Column

6 Investment and duration weighted average compound interest method annual return =

$$\frac{\sum_{i=1}^{n} \begin{cases} (t_i)(I_i)\left[(1+R_i)^{365/t_i} - 1\right] & \text{if } R_i \geq -1 \\ (t_i)(I_i)\left(\frac{L_i}{I_i}\right) & \text{if } R_i < -1 \end{cases}}{\sum_{i=1}^{n} t_i I_i}$$

7 Duration weighted average, compound interest method annual return =

$$\frac{\sum_{i=1}^{n} \begin{cases} (t_i)\left[(1+R_i)^{365/t_i} - 1\right] & \text{if } R \geq -1 \\ (t_i)\left(\frac{L_i}{I_i}\right) & \text{if } R_i < -1 \end{cases}}{\Sigma t_i}$$

(See next page)

EXHIBIT 8 (continued)

Column

8 Compound interest method average annual return =

$$\frac{\sum_{i=1}^{n} \begin{cases} (1+R_i)^{365/t_i} - 1 & \text{if } R \geq -1 \\ \frac{L_i}{I_i} & \text{if } R < -1 \end{cases}}{n}$$

11 Investment and duration weighted average, continuously compounded annual return =

$$\frac{\sum_{i=1}^{n} \begin{cases} (t_i)(I_i)(365/t_i)(\ln(1+R)) & \text{if } R \geq 0 \\ -(t_i)(I_i)(365/t_i)(\ln(1+|R|)) & \text{if } R < 0 \end{cases}}{\sum_{i=1}^{n} t_i I_i}$$

12 Duration weighted average, continuously compounded annual return =

$$\frac{\sum_{i=1}^{n} \begin{cases} (t_i)(365/t_i)(\ln(1+R)) & \text{if } R \geq 0 \\ -(t_i)(365/t_i)(\ln(1+|R|)) & \text{if } R < 0 \end{cases}}{\sum_{i=1}^{n} t_i}$$

13 Continuously compounded average annual return =

$$\frac{\sum_{i=1}^{n} \begin{cases} (365/t_i)(\ln(1+R) & \text{if } R \geq 0 \\ -(365/t_i)(\ln(1+|R|) & \text{if } R < 0 \end{cases}}{n}$$

TABLE 5

OPTION WRITER PROFITABILITY

	Options 1 to 759				Options 1 to 1034	
Option Writer	Average Dollar Gain Per Option Contract Written	Average Opportunity Cost Per Option Writing Chance	Opportunity Cost Less Dollar Gain Per Option Written	Number of Options Written	Average Dollar Gain Per Option Contract Written	Number of Options Written
1	$ 176	$ 193	$ 17	17	$ 181	18
2	102	271	169	7	102	7
3	12	38	26	27	35	31
4	-164	106	270	25	-110	28
5	0	21	21	8	16	9
6	-2691	-1544	1147	2	-2691	2
7	79	-225	-304	1	79	1
8	-239	-281	-42	2	-239	2
9	36	99	63	64	46	82
10	211	285	74	23	175	37
11	243	101	-142	1	243	1
13	74	101	27	46	-41	65
14	105	-138	-243	3	105	3
16	-618	-671	-53	20	-363	27
18	61	-25	-86	4	61	4
20	-48	165	213	34	-48	34
21	160	38	-122	3	308	4
22	4	33	29	1	4	1
23	-467	91	558	5	-344	6
24	221	63	-158	2	-110	5
25	148	182	34	1	148	1
26	262	338	76	1	262	1
27	-197	-148	49	6	-197	6
28	-3	87	90	16	-3	16

TABLE 5 (continued)

OPTION WRITER PROFITABILITY

Option Writer	Options 1 to 759: Average Dollar Gain Per Option Contract Written	Options 1 to 759: Average Opportunity Cost Per Option Writing Chance	Options 1 to 759: Opportunity Cost Less Dollar Gain Per Option Written	Options 1 to 759: Number of Options Written	Options 1 to 1034: Average Dollar Gain Per Option Contract Written	Options 1 to 1034: Number of Options Written
29	$ 87	$ 179	$ 92	17	$ 87	17
30	262	150	-112	17	195	19
31	100	143	43	1	100	1
32	142	244	102	20	168	28
33	-23	-208	-195	3	48	5
34	228	31	-197	1	228	1
35	-1036	74	1110	3	-1036	3
36	232	444	212	1	232	1
37	-204	706	910	9	-204	9
39	259	1175	916	6	259	6
40	-1560	-181	1379	5	-1560	5
41	163	38	-125	1	163	1
42	185	53	-132	1	185	1
45	-28	102	130	23	-28	23
46	109	326	217	9	109	9
47	323	3125	2802	2	323	2
48	118	154	36	12	118	12
49	-484	-379	105	14	-343	19
50	-153	70	223	4	-200	6
51	-67	-400	-333	1	115	3
52	105	67	-38	1	105	1
53	751	1375	624	1	751	1
54	-51	-142	-91	1	212	10
55					46	3

TABLE 5 (continued)

OPTION WRITER PROFITABILITY

Option Writer	Options 1 to 759: Average Dollar Gain Per Option Contract Written	Options 1 to 759: Average Opportunity Cost Per Option Writing Chance	Options 1 to 759: Opportunity Cost Less Dollar Gain Per Option Written	Options 1 to 759: Number of Options Written	Options 1 to 1034: Average Dollar Gain Per Option Contract Written	Options 1 to 1034: Number of Options Written
56	$ 188	$ 407	$ 219	5	$ 188	5
57	-67	76	133	3	-67	8
58	810	1250	440	1	810	1
59	190	584	394	2	190	2
60	184	377	193	2	184	2
61	304	367	63	40	304	40
62	-227	-121	106	2	12	3
63	-18	101	119	19	-18	19
64	30	250	220	3	30	3
67	77	16	-61	11	77	11
68	1	76	75	48	1	48
70	93	27	-66	1	93	1
71	-453	40	493	1	-453	1
72	-290	74	364	2	-290	2
74	53	81	28	10	53	10
75	296	41	-255	1	296	1
76	246	800	554	2	246	2
77	195	-25	-220	1	195	1
78	240	936	696	3	240	3
79	-103	60	163	12	-103	12
80	1751	25	-1726	1	1751	1
81	178	1179	1001	3	178	3
82	-944	-685	259		-616	5
83	-467	-269	198	21	-432	25

TABLE 5 (continued)

OPTION WRITER PROFITABILITY

Option Writer	Options 1 to 759: Average Dollar Gain Per Option Contract Written	Options 1 to 759: Average Opportunity Cost Per Option Writing Chance	Options 1 to 759: Opportunity Cost Less Dollar Gain Per Option Written	Options 1 to 759: Number of Options Written	Options 1 to 1034: Average Dollar Gain Per Option Contract Written	Options 1 to 1034: Number of Options Written
84	$ 205	$ 377	$ 172	38	$ 71	45
86	300	295	-5	6	10	8
87	288	294	6	2	288	2
88	206	153	-53	3	-408	4
89	32	66	34	3	32	3
99					-851	1
181					-247	1
283					-2250	1

TABLE 6

PROFIT RESULTS ON OPTION CONTRACTS GROUPED BY OPTION DURATION

DURATION*	(1)**	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)***	(17)
21	-281	3702	-7.6	0.	0.	-74.7	-74.7	-74.7	0.	7300	-127.2	-127.2	-127.2	0.	5162	21	8
30-35	-35	5258	-.7	365.	-.2	20.1	8.9	3.4	73.3	-.1	-6.0	-26.7	-36.7	112.7	-.7	30	12
46-70	-8	7478	-.1	583	-4.3	3.9	5.4	5.4	26.4	-1.3	0.	1.9	1.4	34.1	-2.9	63	176
81-110	-70	6119	-1.1	633	-3.0	-.7	.2	.4	26.6	-.9	-3.6	-2.5	-2.4	29.3	-1.4	94	302
120-165	75	6373	1.2	266	.6	3.4	1.1	1.4	8.6	.4	3.1	.9	1.1	8.3	.3	134	4
183-204	51	5111	1.0	639	-2.3	3.0	3.2	4.1	22.4	-.5	2.3	2.3	3.0	21.0	-1.3	189	338
214-286	120	7034	1.7	769	-.5	3.2	2.9	-.9	19.7	-.9	-.5	-.7	-1.1	19.0	-.9	232	11

* (Expiration date - trade date)

** See page 65 for explanation of column headings

*** 2(date action taken - trade date)/ number of options written

TABLE 7

PROFIT RESULTS ON OPTION CONTRACTS GROUPED BY OPTION TYPE

OPTION TYPE	(1)*	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
CALL	18	4338	.4	541	-4.3	4.1	4.9	4.3	28.6	-.8	1.6	2.9	.4	33.6	-2.0	130	332
PUT	64	4186	1.5	359	1.5	7.4	3.6	.9	33.8	-.3	4.5	.7	-7.3	51.8	-2.8	120	81
STRADDLE	-49	7317	-.7	692	-2.3	.3	.0	..7	24.2	-1.2	-1.3	-1.6	-1.3	26.9	-2.0	123	417
STRIP	-2	13367	0.0	932	-.6	1.2	3.5	-.9	22.3	-.6	0.0	2.2	-2.4	23.5	-.7	143	8
STRAP	706	14102	5.0	347	-.1	14.6	14.1	13.9	2.5	-.1	13.6	13.2	13.0	2.2	-.2	145	5
STRIP	-135	9634	-1.4	1285	-1.6	-1.8	-.9	.7	25.5	-1.2	-2.7	-1.9	-.2	25.3	-1.2	129	8

*See P. 65 for explanation of column headings.

TABLE 10

PROFIT RESULTS ON OPTION CONTRACTS GROUPED BY STRIKING PRICE

Striking Price	(1)*	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
$8.875 to 29.875	4	3251	0.1	342	-2.2	2.0	2.8	3.5	23.2	-.8	.8	1.5	2.0	23.0	-1.1	143	310
30.000 to 49.875	-86	5788	-1.5	671	-2.7	-1.3	-.1	-1.4	31.0	-.8	-3.7	-2.6	-6.5	40.3	-2.2	115	317
50.000 to 79.875	51	8403	.6	575	-2.7	3.7	4.5	5.4	24.6	-.4	2.1	2.9	2.3	30.3	-3.5	114	146
80.000 to 197.875	160	12,952	1.2	1125	-2.3	6.3	7.0	5.8	26.6	-1.4	3.9	4.6	2.2	32.7	-2.6	122	78

*See page 65 for explanation of column headings.

TABLE 11

PROFIT RESULTS ON OPTION CONTRACTS GROUPED BY OPTION OUTCOME

ACTION TAKEN	(1) *	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
CALLED	292	6259	4.8	212	1.3	15.4	16.4	16.5	15.9	-2.8	14.1	14.8	13.7	21.4	-5.7	121	389
PUT	-458	6423	-7.1	749	-2.1	-16.8	-17.1	-19.2	24.9	-.6	-19.1	-19.3	-23.8	36.7	-2.7	125	232
EXPIRED	-66	4633	-1.4	647	-3.3	-.7	-.6	-.5	29.2	-9.6	-3.5	-2.6	-3.5	30.7	-1.2	134	220
BOTH SIDES STRADDLE	-27	7665	-.4													124	2
2 PUTS STRIP	-1060	17122	-6.2													93	3
2 CALLS STRAP	706	14102	5.0													145	5
EXTENDED	457	7902	5.8													97	1

*See P. 65 for explanation of column headings.

TABLE 12

PROFITABILITY OF OPTION WRITING AS A FUNCTION OF TRADE AND EXPIRATION DATES

Month	Number of Options with Trade Dates During Indicated Month	Average Rate of Return[1] on Option Contracts Written During the Month	Number of Options with Expiration Dates During Indicated Month	Average Rate of Return on Options Scheduled to Expire During the Month	Dow Jones Industrial Average[2]
4/60	11	-2.38%			613.6
5					628.0
6					635.9
7	26	2.33			621.7
8					627.8
9	16	3.18			598.4
10	24	2.98	5	.00%	579.7
11	39	2.34	16	-1.05	598.6
12	74	3.49	18	.68	605.7
1/61	76	3.89	15	4.02	630.5
2	72	2.37	41	1.15	649.5
3	114	.00	36	3.47	670.3
4	87	-3.12	45	2.59	684.7
5	56	-3.20	73	2.55	691.6
6	92	-.03	80	-.18	692.2
7	60	-6.16	72	1.41	692.3
8	38	-5.93	89	.91	718.1
9	34	1.38	76	-1.72	709.2
10	23	.89	102	-4.00	702.9
11	9	-3.06	53	-4.51	719.1
12			60	-.63	727.5
1/62			70	-.45	707.5

[1] TOTAL GAIN/TOTAL INVESTMENT

[2] Average of high and low prices for the month.

CHAPTER V

STOCK QUALITY AND OPTION WRITING

In this chapter, the author briefly examines the question of whether some measure of the "investment quality" of a stock can be associated with the attractiveness of that stock for option writing. Such a measure of quality could also be used to compare the quality level of an option writer's investment portfolio with the quality level of stocks that are potential additions to his portfolio through option writing.

Stocks put to the writer or stocks bought to hedge call options which were not called must be utilized in some manner. Whether the writer will add these stocks to his regular investment portfolio, sell them to acquire cash, or use them to hedge call options is open to question. The writers studied in this thesis, however, are all advised by their agent to write options only on stocks they would be willing to hold in their portfolio on a long term basis. Therefore, by comparing the quality level of his investment portfolio with the quality level of potential additions, the extent to which an option writer is willing to change the quality level of his present investment portfolio to accommodate the desires of option buyers can be determined.

The stocks owned by the writer used to hedge call options must be used to represent the present quality level of his investment portfolio, since they make up the only sample available. These stocks, however, may not accurately represent this present quality

level if they are stocks the writer wishes to eliminate from his portfolio because their quality level is too low. The study must proceed under these limitations.

The quality measure[1] the author has chosen to investigate in this study was designed by the Value Line Investment Survey to reflect past growth in dividends and earnings and past stability of price behavior of a particular stock relative to other stocks. If this quality measure is an accurate predictor of future performance, it should correlate well with the profitability of writing options on particular stocks and the desirability of holding particular stocks in an investment portfolio.

Stability is weighted about three times as much as earnings and dividends growth in determining the quality grade of a particular stock. Nine grades ranging from A+ to C- are used to rate stocks. Quality ratings for the stocks considered in this study if rated by Value Line are given in Exhibit 4.

The 722 options numbered 1 to 759 were used in evaluating the usefulness of the Value Line investment quality rating as a predictor of future performance. This group of options rather than the whole sample set were used in the test of quality vs. outcome to be consistent with the sample used when testing the potential quality change in writers' portfolios.

The 722 options were divided into quality groups based on quality

---

[1]This quality measure is described in greater detail in The Evaluation of Common Stocks, by Arnold Bernhard (Simon and Schuster, New York, 1959), p. 41.

raings assigned by Value Line to the stocks on which the options were written. The results of the profit calculations by quality groups are shown in Table 13. Outcome, as measured by average rate of return per option contract sold, when regressed with quality yielded a correlation coefficient of .61, which is significant at the 10 percent level. These results are shown in Figure 3 . Therefore the hypothesis that option writing profitability is independent of quality is rejected.

The results are somewhat affected by the specific Value Line quality ratings used, those assigned to each stock on August 28, 1961. This use of quality ratings existing at a single point in time introduces a small amount of inaccuracy into the results, since ideally the quality rating given to each stock at the time the option is written should be used.[2]

A second factor that could have affected the regression of outcome on quality is the fact that the options written on stocks in the extreme quality groups may not be adequate samples. The C- quality groups consisted of three options on two different stocks;

---

[2]Quality ratings are revised quarterly. The author weighed the large additional amount of time involved in obtaining quality information on a particular stock at the time an option was written and the additional data processing required vs. the potential gain in accuracy that could be achieved. He decided in favor of the method used. A comparison of one set of quarterly ratings with the succeeding set showed only a few cases where ratings were changed, and then only by one quality class. Texas Instruments, one of the stocks in the sample studied, had a very large price fall during the period under consideration. It had a quality rating change from A- to B-, but this occurred on February 5, 1962, six days after the end of the period under consideration.

the C quality group, six options on four different stocks; and the A+ quality group, eight options on two different stocks. Value Line gave nine stocks a C- rating, 57 stocks a C rating, and eight stocks an A+ rating. These extreme quality groups have large opposite values for rate of return per option contract sold which were very important in determining the significant correlation coefficient found between quality and outcome. Therefore if the sample used to represent each of these groups is not representative of the performance of the quality group as a whole, the regression of outcome on quality gave inaccurate results. Another reason these results are not entirely accurate is that outcome has not been adjusted for duration.

The small number of options written in the C- to C quality groups could indicate that the advice of the writers' agent to sell options only on stocks they would like to hold in their portfolios on a long term basis, is followed. However, this result could also be attributed to the fact that the stocks in which option buyers are interested fall mostly into the middle and upper quality groups. Therefore, on the basis of this evidence, nothing conclusive regarding the quality distribution of the put and call options writers prefer selling can be said. We do not know to what extent they decline option writing opportunities on low quality stocks.

Even though the mean quality level of the stocks on which options were sold and the stocks rated by Value Line were very close, 5.07 vs. 5.19, the quality distribution of stocks on which options are sold is different from the quality distribution of all stocks rated by Value Line at the 1 percent level of significance. This result

was found by a test of significance applied to the cumulative distribution function for the probability of occurrence of a certain quality level or higher.[3] The greatest difference between the cumulative distribution functions occurs at the A- quality level, the number of stocks with quality ratings of this grade or higher being significantly greater than the number of options being written on these quality grades.

It is possible to infer from the preponderance of middle quality options relative to the quality distribution of Value Line stocks, the desire of option buyers to concentrate on stocks in the middle quality range. Option writers would not be adverse to writing options on high quality stock.

The above conclusions must be tempered by the 109 options written which were not assigned quality ratings by Value Line. The negative rate of return per option contract sold, -4.95 percent, associated with this group of options indicates the stocks the options were written on would probably fall in low quality groups if they had been assigned a rating.

Of these 109 options sold, 46 or 42 percent of the total were puts, or calls which were hedged by stock bought specifically for that purpose. In the rest of the sample consisting of options on stocks to which quality ratings were assigned, 331 or 54 percent of the total were puts, or calls which were hedged by stock bought

---

[3]See Massy, F. J., Jr., "The Kolmogorov-Smirnov Test for Goodness of Fit", Journal of the American Statistical Association, March, 1951, Vol. 46, pp. 68-78.

specifically for that purpose. This difference is significant at the 5 percent level.[4]

Since the unrated stocks probably fall into low quality groups, it can be concluded that whenever options are sold on stock not owned by the option writer, the stock is more likely to be of high or average quality than low quality. Again, no specific evidence is available as to whether this was due to writer selectivity or whether these were just the option writing opportunities that presented themselves.

It is interesting to note the high correlation coefficient between the quality rating and the average investment per option written in each quality group, .90. This significant correlation coefficient indicates that the higher quality stocks are usually the higher priced ones. It also tends to confirm the hypothesis that the 109 options written on unrated stocks probably fall into low quality groups. Their average investment per option contract, $3,965, places them somewhere in the C quality range.

In addition to finding a relationship between quality and outcome, relationships found existing between quality and the variance of outcome and quality and the skewness of the outcome distribution would have been desirable. Unfortunately, such relationships were not indicated in the data studied, low correlation coefficients of +.26 and +.25 existing respectively between quality and variance and quality and skewness of dollar return per option contract written.

---

[4] X^2 test for the significance of a difference in proportions was used. See M. J. Moroney, Facts From Figures, (Penguin Books, Baltimore, 1960), p. 254.

To attempt a more accurate estimate of the effect of option writing on the quality level of a writer's portfolio of stocks, some tests of the mean and variance of the quality levels of stocks presently owned were made against the means and variance of the quality levels of the stocks that could potentially be added to the writer's portfolio through his writing activities.

Because some stocks do not have ratings assigned to them by Value Line, two sets of tests were made, one including and one excluding options written on these stocks. When included, a B- rating was given to the stocks not rated by Value Line.[5] The following hypotheses regarding the means and variances of different stock groupings were tested:

(1) The mean and variance of the quality distribution of the stocks held in the writer's portfolio is the same as the mean and variance of the quality distribution of the stocks purchased to hedge option sales and the stocks on which puts were sold.

(2) The mean and variance of the quality distribution of those stocks held in the writer's portfolio are the same as the mean and variance of the quality distribution of the stocks purchased.

(3) The mean and variance of the quality distribution of all stocks held is the same as the mean and variance

---

[5]This rating was selected prior to making the analysis described on the preceding pages. On the basis of the return earned on options written on the unrated stocks, -4.95 percent per option contract sold, a lower quality rating would have been chosen.

of the quality distribution of those stocks on which puts were sold.

The procedure used was as follows:

The quality ratings associated with the stocks studied were punched on cards in sequence according to the code numbers initially assigned to the stock. An additional item was punched which indicated whether the rating had been assigned by Value Line or by the author.

The ratings were fed to a computer using a program which associated each rating with its corresponding stock identification number. The punched cards for each option contract were now entered into the computer and tested to see which stock was optioned. Then an output card was punched with the quality rating of the stock and the code describing the source of the rating, along with the information on the original cards necessary for further analysis.

A second program was now used which tested each option to see whether it was a put, whether stock had been purchased to hedge the option[6], and whether Value Line had assigned the quality rating. The number of option contracts having stocks falling in each group and their respective qualities were totaled and t and f tests of significance used to test the means and variances of the various

---

[6]Each of the straps in the sample should have been counted twice, since 200 shares are necessary to hedge the call sides of the option. Since there were only five straps in the sample, it is believed that no significant bias was introduced.

groups for any significant difference.[7] The two programs used are presented in Appendix 7.

The results for each test made on the 722 options in this sample show no significant difference in the mean quality levels of the distributions at the 10 percent level of significance. The number of options falling in each group considered and the average quality for that group are tabulated in Table 14.

The only significant difference between the variances of the quality distributions was found at the 10 percent level between the distribution of quality of stocks held and the distribution of quality of stocks on which puts were sold (both for all stocks and for only those stocks rated by Value Line). The variance of the quality distribution of the stocks held is the greater. Therefore the stocks on which put options were sold were more concentrated around the mean quality level of stocks already held than the stocks determining this mean. It is not known whether the interests of the option buyers or the desires of the option writers caused the stocks put options were sold on to have this high average quality rating concentration.

These tests on means and variances were also made for some of the individual option writers. Those selected had a large enough number of option contract sales to make it unlikely the sample would be biased. Unfortunately, these clients sold very few put contracts, so separate tests on the quality of this group vs. the quality of

---

[7]See Bowker and Lieberman, Handbook of Industrial Statistics, (Prentice-Hall, Englewood Cliffs, 1955), p. 852, for descriptions of the t and f tests used.

stocks already held could not be made.

Writers 9, 10, 13, and 84 had at least ten option contracts sold in each of the groupings made (both the entire stock groups and only that segment of each group rated by Value Line) other than the grouping, number of puts sold. For writers 9 and 10, the tests previously described showed that the hypothesis that the mean and variance of the distributions tested were the same, could not be rejected at the 10 percent level of significance. For writer 84, the means of the quality distributions were not significantly different, but all the variances were different at the 10 percent level of significance. The variance of the quality of the stocks that originally were in the writer's portfolio was much larger than the variance of the quality of the stocks purchased. The mean quality levels of the groups tested for writer 13 were all significantly different at the 10 percent level. The stocks writer 13 purchased and sold puts on had a significantly lower quality level than the stocks he originally held.

While the last result indicates that some clients may be changing the quality level of their portfolio in the direction of lower quality stocks to accommodate the desires of option purchasers, the sample is not random, and this is an isolated case in which the stocks representing the writer's portfolio may not be representative. The quality level of option writers' investment portfolios cannot be shown as changing when all the options in the sample are considered as a group.

To recapitulate, the correlation coefficient between outcome

and quality, .61, is significant at the 10 percent level indicating there is a relationship between the quality rating of the stock optioned and the direction of future price movement of the stock. The Value Line "investment quality" rating is the type of quality measure that option writers using a calls-hedged, puts-margined strategy could use to their advantage in determining the stocks on which to sell options.

While no positive statement can be made about why more options are not written in the low quality groups, it can be said that more options are not written in the higher quality groups because option buyers are not especially interested in these stocks. This is probably because of the stable behavior of the stocks.

While it may occur in some individual cases, option writers as a whole do not appear to be changing the quality level of their portfolios through their acquisition of stock to hedge call options or from stock put to them.

TABLE 13

PROFIT RESULTS ON OPTIONS BROKEN DOWN BY QUALITY[1]
OF THE STOCKS ON WHICH OPTIONS WERE WRITTEN[2]

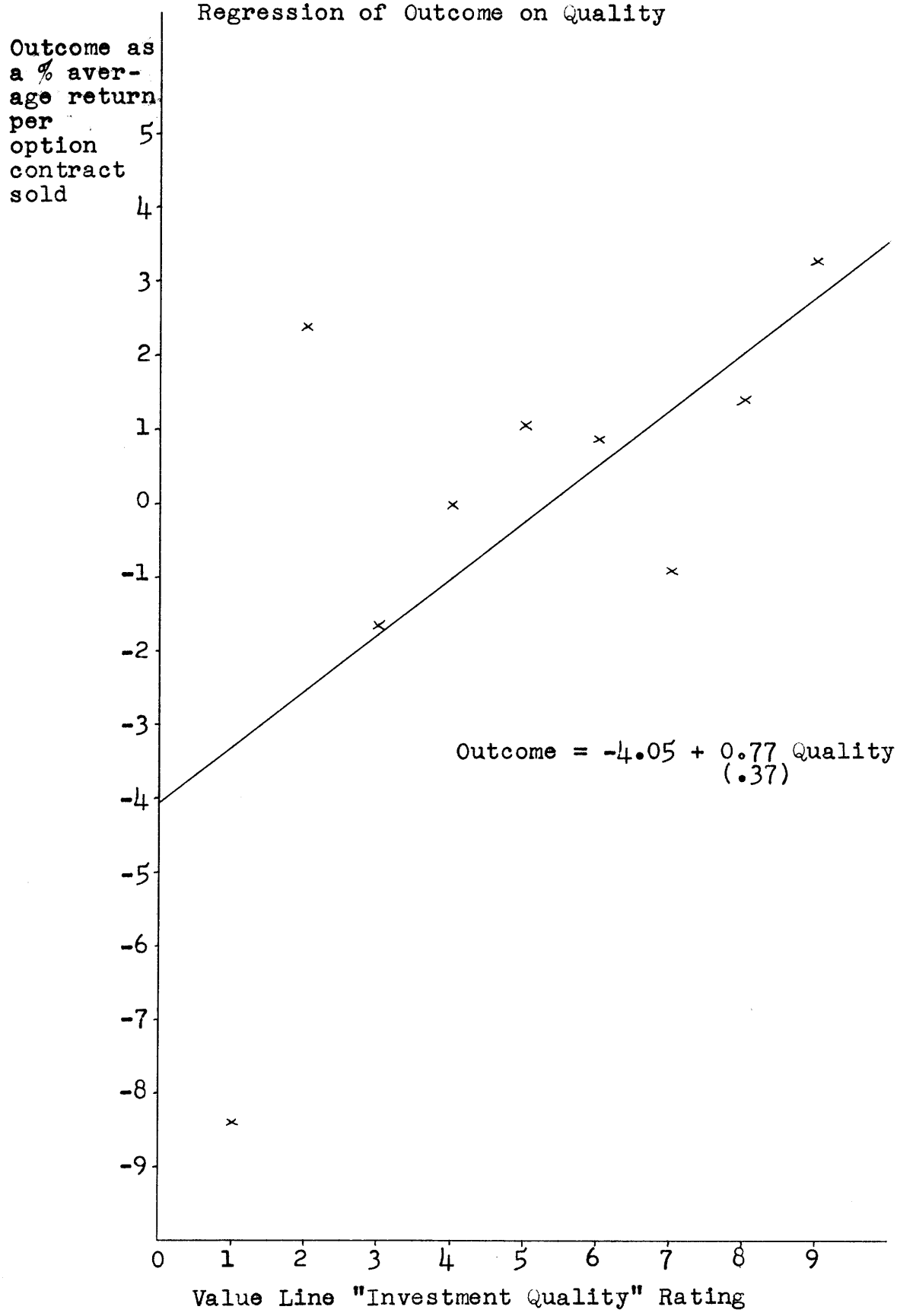
QUALITY	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
A+	349	10,748	3.25	108	.4	10.1	10.5	11.3	3.2	.2	9.6	10.0	10.7	2.9	.2	124	8	1
A	100	6,964	1.38	543	-.3	5.1	4.0	7.7	21.5	1.0	3.9	2.9	6.0	18.7	.3	132	43	12
A-	-107	11,438	-.94	1,442	-2.0	2.4	5.5	2.0	31.5	-1.7	-1.9	1.7	-3.5	43.0	-2.1	113	33	12
B+	63	7,360	.86	476	-.5	4.6	3.1	3.8	26.0	.3	3.0	1.4	1.3	25.0	-.5	107	143	18
B	69	6,173	1.12	397	-1.2	5.2	6.6	2.7	27.6	-1.2	3.5	4.5	-2.3	38.3	-2.6	118	166	22
B-	-2	4,850	.00	582	-4.2	2.9	4.6	4.9	26.3	-.4	0.5	2.8	2.1	28.5	-2.1	124	122	15
C+	-74	4,354	-1.71	740	-2.7	.7	6.5	4.4	29.5	-1.7	-3.8	3.4	.6	35.3	-2.0	125	89	13
C	94	3,796	2.41	193	-.2	9.0	8.6	9.0	21.1	-.5	7.8	7.3	7.3	20.3	-.6	115	6	6
C-	-127	1,518	-8.40	96	-.4	-15.2	-16.0	-16.0	1.5	.4	-15.1	-16.0	-16.0	1.5	.4	194	3	1
UNKNOWN	-178	3,965	-4.95	663	-2.6	-8.7	-6.4	-4.9	28.7	-.6	-10.2	-8.0	-6.7	29.2	-.8	138	109	
																TOTAL	722	100

[1]Value Line Quality Rating.

[2]See page 89 for explanation of column headings.

Fig. 3

Regression of Outcome on Quality



Column Key for Tables Describing Profitability Results [1]

lumn 1	Average dollar gain per option contract sold (in dollars)
2	Average investment per option contract sold (in dollars)
3	Average return per option contract sold (column 1 ÷ column 2)
4	Standard deviation of dollar gain per option contract sold (in dollars)
5	Skewness of dollar gain per option contract sold
6	Investment and duration weighted average, compound interest method annual return (p
7	Duration weighted average, compound interest method annual return (percent)
8	Compound interest method average annual return (percent)
9	Standard deviation of compound interest method average annual return (percent)
10	Skewness of compound interest method average annual return
11	Investment and duration weighted average, continuously compounded annual return (pe
12	Duration weighted average, continuously compounded annual return (percent)
13	Continuously compounded average annual return (Percent)
14	Standard deviation of continuously compounded average annual return (percent)
15	Skewness of continuously compounded average annual return
16	Average duration of an option contract (in days)
17	Number of option contracts
18	Percent of the 978 stocks rated by value line on 8/28/61 given this rating

[1] See page 66 for definition of profit measures used.

TABLE 14

QUALITY RATINGS OF STOCKS OPTIONED

		Number of Occurrences	Average Quality[1]
(1)	Stock bought to hedge call options	318	4.94
(2)	Stock rated by Value Line bought to hedge call options	289	5.03
(3)	Stock on which puts were sold	64	4.88
(4)	Stock rated by Value Line on which puts were sold	47	5.20
(5)	Stock owned by writers used to hedge call options	340	4.85
(6)	Stock rated by Value Line, owned by writers and used to call options	273	5.06

[1] 9 quality levels: A+ = 9, A = 8, A- = 7, ... C- = 1

Stocks not rated by Value Line have been rated B- = 4

CHAPTER VI

DEVOTING FIXED AMOUNTS OF CAPITAL TO OPTION WRITING

Put and call option writing has been discussed in this thesis under the assumption that an option writer has only part of his capital devoted to this activity. The impression has been gained from various investment circles that most writers do not devote their capital solely to option writing, that those who have done so have not been happy with the results, and that the prevailing philosophy believes option writing is a profitable auxiliary activity to managing an investment portfolio.

Some of the possible tax advantages associated with option writing and the opportunity to write options on stocks presently owned or desired can make the activity a profitable sideline. However, the possibility of capital devoted solely to option writing earning as much or more profit than an investment portfolio is not precluded.

Whether part or all of the investor's capital is devoted to option writing, the question of the minimum amount of capital necessary to engage in this activity is open to question. At what level of capital is the risk of loss for not having spaced option sales over a sufficient period of time and over a large enough range of stocks too high?

Denmar Corporation, an agent for many option writers, does not like to act as agent for any client with less than $50,000 to invest in put and call option writing. Kruizenga[1] notes "one option dealer

---

[1]Kruizenga, Richard, "Put and Call Options: A Theoretical and Market Analysis", unpublished Ph.D. thesis, M.I.T., 1956, p. 69.

estimates that a portfolio of $50,000 is the smallest upon which options could be written with sufficient regularity to make it worthwhile." No statistical evidence is cited to support this assertion. The amount of capital actually needed to write options is a function of the writer strategy. For example, the amount needed would be less if a mixed strategy[2] rather than a pure strategy were used, since only fixed percentage losses of capital for price movements in any one direction would occur.

To shed more light on the two questions of devoting a fixed amount of capital to option writing and the minimum amount of capital necessary to write options safely, the writer has simulated the actions of a hypothetical option writer as follows:

A fixed amount of capital is assigned to the option writer. The writer is then faced with the option writing opportunities used as data in this thesis, presented in chronological order. If the writer has sufficient capital to make the investment, he does so; if not, the next investment is considered. Investments that have been made are liquidated as they come due.

A flow diagram of the computer program written to do this simulation is shown in Exhibit 9 and the program itself in Appendix 8 The input data are the results from the option writing profit program. These results represent actual historical investment and profit per option contract. The simulation has been run for initial writer investments of 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 100,

---

[2]Boness, op. cit., supra p. 31.

150, 200, 300, and 500 thousand dollars.

As the amount of capital initially attributed to the option writer increases, the option writer will not necessarily be writing the same options he did with a lesser amount of capital, plus additional ones the increase in capital has made possible. Timing differences in the availability of capital may occur, since an option may now be written which was passed by when sufficient capital to cover the option was not available.

The results obtainable from the simulation are not quite as accurate as would be desired in the ultimate. The following factors which affect the simulation profitability calculations have not been adjusted for, but tend to balance each other out:

(1) No interest earnings on idle cash are imputed to the option writer. Idle cash is present (a) at the beginning of the period considered when the writer is waiting to cover option contract sales as they materialize, (b) may be present during the period when available capital is inadequate to provide coverage on an additional option contract, and (c) is present at the end of the period when option contracts are being exercised or expire and an insufficient number of option writing opportunities are presenting themselves.

(2) No commission or transfer tax fees are charged the option writer on the sale of stock bought to hedge which was not called, or on stock put to the writer. This is because the input to the simulation program

has profitability calculations based on these assumptions.[3]

Another assumption which does not affect the profitability calculations but does abstract from reality is the lack of choice the hypothetical option wrtier has in deciding whether to write a particular option contract. The option contracts which make up the sample studied in this thesis are the summation of "yes" answers to this question by the option writers in the group. This simulation does not leave the option writer the choice to reject a particular option contract if sufficient capital is available to properly hedge and/or margin its sale.

While no specific bias should be introduced into the profitability calculations because of the following factor, it should be noted that options which were written on the same day were considered in the order in which the data for each option was coded and not necessarily in the order in which the options were written.

Initially the simulation was performed assuming that a contract being exercised or expiring on the same day as the opportunity to write a new contract occurs, is terminated before the new opportunity is considered. In evaluating the results from the simulation, the author realized that the reverse order of events is more plausible. It should take a certain amount of time for a writer to be notified that uncommitted capital is available for writing options. Ordering events in the reverse order--i.e., considering new option writing

---

[3]See Chapter 3, p. 40.

opportunities as occurring prior to the termination of any contracts on a particular day--leads to different simulation results. Money now is becoming available to write options a day later than with the original assumptions.

Sample simulations assuming termination of existing option contracts after new writing opportunities are considered are shown in Exhibit 10 for $10,000, $25,000, and $50,000 initial capital. Summaries of the results of both sets of simulations are shown in Tables 15 and 16.

Very little in the way of a positive contribution to the question of how much capital one needs to write options successfully can be derived from the simulation results for this set of data. In this instance (under both sets of assumptions), a writer starting initially with the smallest amount of capital invested, $5,000, would have made the largest percent return on his investment, 13.9 percent. If the writing period had started with some other option contract (No. 559, for example), the writer could have suffered a 20 percent or 30 percent loss of his capital on the first option contract written.

It can only be said that it is possible to write options successfully with a limited amount of capital. However, the variation[4] in the value of one's portfolio of option contract sales and cash could be much greater, the smaller the amount of capital devoted to writing options. Other simulations would have to be run on samples

---

[4]Variation = (maximum value of portfolio over period considered - minimum value) / initial capital invested

of data covering periods of identical length to get a more accurate measure of this variation.[5]

The evidence derivable from the simulations done is inconclusive. The variation in total capital was regressed with the initial capital assumed invested. In the simulation where termination occurs before new options are considered, the correlation coefficient found, -0.51, is significant at the 5 percent level. Unfortunately, the correlation coefficient found for the simulation where termination occurs after new option contracts are considered, -.39, is not significant at the 10 percent level. This tends to throw a real shadow of doubt on the validity of the conclusion that variability of capital is a function of the amount invested; i.e., it cannot be definitely asserted on the basis of the evidence provided by this study that a definite relationship exists between diversification and variability of the investor's capital.

As should be expected on an a priori basis, no relationship has been found between the amount of initial capital assumed and the rate of return earned for the period. The correlation coefficients of +.04 and -.28 found in the two simulations, are not significant.

This simulation provided the opportunity to determine whether a relationship exists between the value of a portfolio of option

---

[5]The author considered dividing his data into two or three groups by a random sampling procedure, and running the simulation on each group. Since each of the samples would be random, however, each should be representative of the population and therefore yield similar results. Therefore this procedure was not followed, since drawing conclusions on the basis of such a set of simulations would be fallacious.

contract sales and the level of the stock market. Figure 4 shows the value of the portfolio which initially contained $500,000 in relation to the Dow Jones Industrial Average, over the period considered. These two variables have a correlation coefficient of +.57, significant at the 5 percent level. This significant correlation coefficient was expected because of the negative correlation found between outcomes grouped by trade date and the Dow Jones Average. The relationship is also implied by the option writing strategy used.

EXHIBIT 9

FLOW DIAGRAM OF SIMULATION

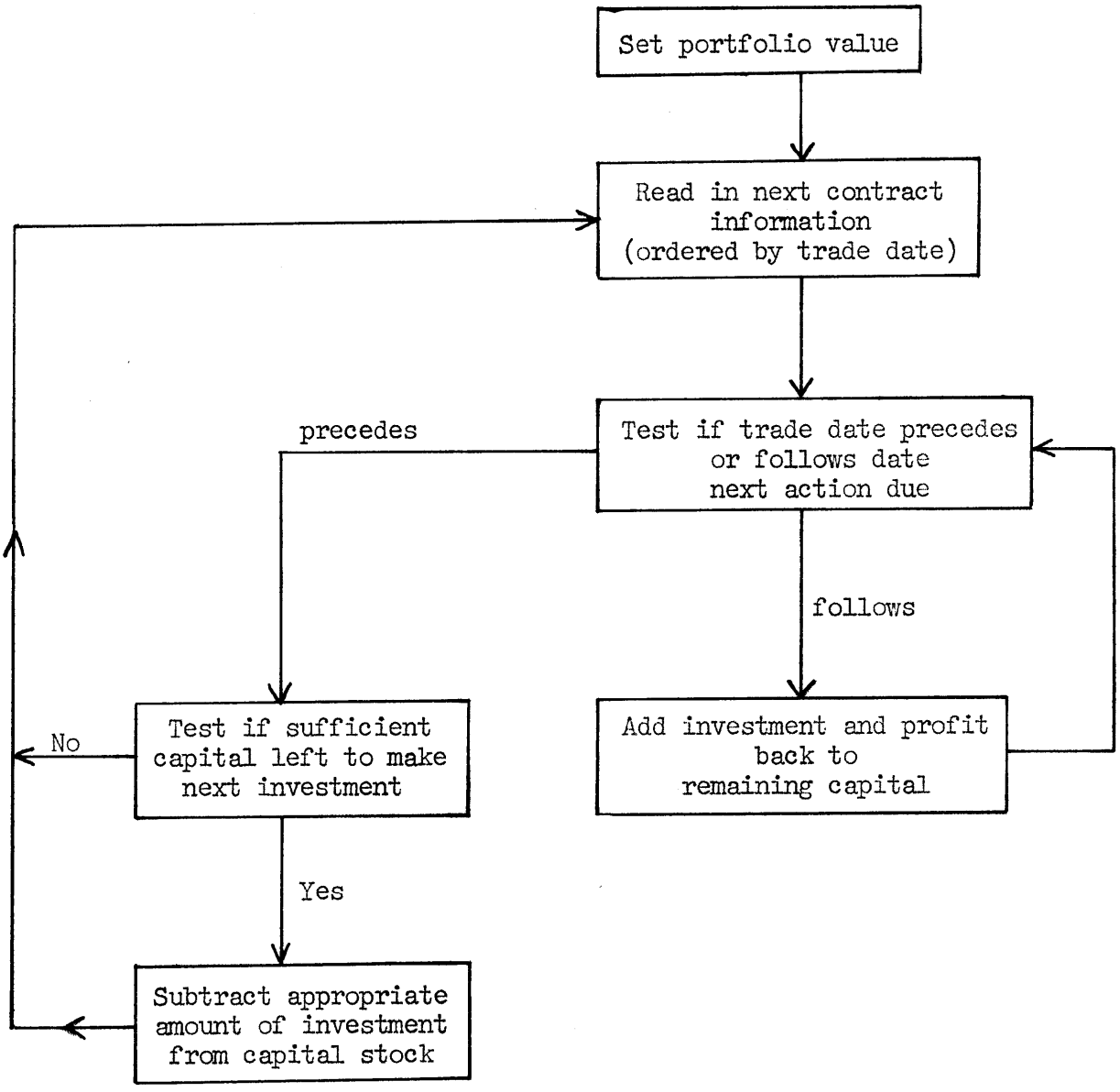


EXHIBIT 10

Sample Simulations* Assuming 10, 25, and 50 Thousand Dollars Initial Capital

Option Number	Trade Date	Expiration Date	Investment	Net Profit	Cash On Hand**	Capital Invested	Total Portfolio Value	
THIS	SIMULATION	ASSUMES	INITIAL CAPITAL=	10000.00				001
123	5591	5784	2625.62	249.33	3011.28	7238.05	10249.33	002
114	5595	5790	1935.43	162.34	2350.30	8061.37	10411.67	003
328	5601	5841	5302.62	401.01	6164.43	4648.25	10812.68	004
284	5850	5939	2077.00	144.97	3040.53	7917.12	10957.65	005
414	5786	5979	2758.75	155.44	3006.48	8106.61	11113.09	006
413	5793	5986	1889.50	107.79	2512.59	8708.29	11220.88	007
16	5842	6035	3268.87	256.50	3815.71	7661.67	11477.38	008
399	5939	6066	1780.37	5.37	2606.89	8875.86	11482.75	009
359	5983	6078	2491.18	-361.06	2308.33	8813.36	11121.69	010
611	6037	6133	2994.56	-373.56	2677.33	8070.80	10748.13	011
450	5944	6137	1167.87	-201.00	3644.20	6902.93	10547.13	012
521	6071	6163	2428.68	4.25	2593.38	7958.00	10551.38	013
897	5988	6182	2222.25	271.12	5086.75	5735.75	10822.50	014
863	6115	6205	2252.00	104.37	7443.12	3483.75	10926.87	015
779	6141	6231	3483.75	253.75	11180.62	.00	11180.62	016

* Assumes new contracts considered before old ones are exercised or expired.

** Immediately after option cited has been exercised or expired.

Option Number	Trade Date	Expiration Date	Investment	Net Profit	Cash On Hand**	Capital Invested	Total Portfolio Value	
THIS	SIMULATION	ASSUMES	INITIAL CAPITAL=	25000.00				001
123	5591	5784	2625.62	249.33	3323.29	21926.04	25249.33	002
114	5595	5790	1935.43	162.34	2662.31	22749.36	25411.67	003
115	5597	5790	6167.50	109.78	8939.59	16581.86	25521.45	004
327	5598	5790	6083.37	131.41	15154.37	10498.49	25652.86	005
306	5612	5805	2437.12	156.22	2830.72	22978.36	25809.08	006
328	5601	5841	5302.62	401.01	6250.60	19959.49	26210.09	007
135	5794	5889	2657.06	130.56	3692.35	22648.30	26340.65	008
284	5850	5939	2077.00	144.97	2752.89	23732.73	26485.62	009
8	5806	5974	2283.75	144.87	3401.14	23229.35	26630.49	010
414	5786	5979	2758.75	155.44	3990.02	22795.91	26785.93	011
299	5794	5979	3782.37	252.97	8025.36	19013.54	27038.90	012
413	5793	5986	1889.50	107.79	1999.78	25146.91	27146.69	013
688	5793	5986	2665.50	208.37	4873.65	22481.41	27355.06	014
689	5793	5986	2665.50	208.37	7747.52	19815.91	27563.43	015
234	5799	5990	1257.06	-541.18	2303.35	24718.90	27022.25	016
16	5842	6035	3268.87	256.50	3726.72	23552.03	27278.75	017
687	6002	6063	2102.00	-91.87	2742.29	24444.59	27186.88	018
3	5976	6065	2325.31	255.75	5323.35	22119.28	27442.63	019
399	5939	6066	1780.37	5.37	7109.09	20338.91	27448.00	020
311	5987	6077	3360.43	-284.87	3505.65	23657.48	27163.13	021
700	5890	6081	3161.43	227.45	6894.53	20496.05	27390.58	022
295	5987	6084	2799.62	-696.31	4050.59	22643.68	26694.27	023
611	6037	6133	2994.56	-373.56	3507.09	22813.62	26320.71	024
505	6084	6144	3164.50	93.45	3281.29	23132.87	26414.16	025
524	6067	6162	6679.00	-51.18	9909.11	16453.87	26362.98	026
530	5979	6164	8022.87	521.07	13844.30	13039.75	26884.05	027
509	6081	6172	4947.25	302.75	7914.99	19271.81	27186.80	028
820	6170	6197	3132.75	-502.56	10545.18	16139.06	26684.24	029
773	6163	6228	4608.75	138.15	15292.08	11530.31	26822.39	030
779	6141	6231	3483.75	253.75	19029.58	8046.56	27076.14	031
987	6169	6234	8046.56	300.28	27376.42	.00	27376.42	032

Option Number	Trade Date	Expiration Date	Investment	Net Profit	Cash On Hand**	Capital Invested	Total Portfolio Value	
THIS SIMULATION ASSUMES INITIAL CAPITAL= 50000.00								198
123	5591	5784	2625.62	249.33	3140.62	47108.71	50249.33	199
114	5595	5790	1935.43	162.34	2479.64	47932.03	50411.67	200
115	5597	5790	6167.50	109.78	8756.92	41764.53	50521.45	201
327	5598	5790	6083.37	131.41	14971.70	35681.16	50652.86	202
117	5603	5797	7746.50	-1006.52	8051.75	41594.59	49646.34	203
306	5612	5805	2437.12	156.22	3150.59	46651.97	49802.56	204
307	5612	5805	2437.12	156.22	5743.93	44214.85	49958.78	205
118	5615	5811	7746.50	-369.02	9141.41	40448.35	49589.76	206
119	5619	5813	4171.87	-576.93	5320.92	43691.91	49012.83	207
120	5623	5818	2312.12	-581.37	2423.37	46008.09	48431.46	208
328	5601	5841	5302.62	401.01	5790.57	43041.90	48832.47	209
12	5798	5863	4915.50	250.52	5610.72	43472.27	49082.99	210
303	5695	5888	768.56	-71.93	1583.10	47427.96	49011.06	211
135	5794	5889	2657.06	130.56	4370.72	44770.90	49141.62	212
39	5811	5906	2633.75	142.24	2900.46	46383.40	49283.86	213
40	5811	5906	2633.75	142.24	5676.45	43749.65	49426.10	214
284	5850	5939	2077.00	144.97	2417.42	47153.65	49571.07	215
20	5833	5940	1107.75	83.99	1828.79	47826.27	49655.06	216
427	5818	5955	1228.68	128.93	1924.94	47859.05	49783.99	217
314	5890	5955	4246.25	126.15	6297.34	43612.80	49910.14	218
8	5806	5974	2283.75	144.87	2499.04	47555.97	50055.01	219
414	5786	5979	2758.75	155.44	3087.92	47122.53	50210.45	220
299	5794	5979	3782.37	252.97	7123.26	43340.16	50463.42	221
413	5793	5986	1889.50	107.79	2123.68	48447.53	50571.21	222
688	5793	5986	2665.50	208.37	4997.55	45782.03	50779.58	223
689	5793	5986	2665.50	208.37	7871.42	43116.53	50987.95	224
233	5799	5990	2579.00	-1152.50	3137.87	46697.58	49835.45	225
281	5906	5990	3390.50	176.03	6704.40	43307.08	50011.48	226
35	5812	5995	2147.93	433.81	2607.14	47838.15	50445.29	227
409	5806	5997	1696.25	123.64	4427.03	46141.90	50568.93	228
133	5813	6003	2668.87	228.04	3606.44	47190.53	50796.97	229
322	5814	6007	1959.43	140.56	3481.12	47456.41	50937.53	230
16	5842	6035	3268.87	256.50	5208.56	45985.47	51194.03	231
7	5941	6035	1261.46	70.17	6540.19	44724.01	51264.20	232

Option Number	Trade Date	Expiration Date	Investment	Net Profit	Cash On Hand**	Capital Invested	Total Portfolio Value	
127	5864	6046	4724.25	379.85	5611.92	46032.13	51644.05	233
437	5955	6050	2223.62	-327.25	2821.17	48495.63	51316.80	234
722	5955	6050	2180.37	-276.12	4725.42	46315.26	51040.68	235
312	6003	6063	2225.31	93.12	3139.85	47993.95	51133.80	236
3	5976	6065	2325.31	255.75	5720.91	45668.64	51389.55	237
399	5939	6066	1780.37	5.37	7506.65	43888.27	51394.92	238
56	5980	6070	3697.25	-561.25	3963.65	46870.02	50833.67	239
257	5982	6072	3299.62	158.81	4654.21	46338.27	50992.48	240
311	5987	6077	3360.43	-284.87	7729.77	42977.84	50707.61	241
295	5987	6084	2799.62	-696.31	5000.71	45010.59	50011.30	242
400	5990	6085	6679.00	-689.56	7825.65	41496.09	49321.74	243
600	6035	6100	3955.37	-58.75	5059.52	44203.47	49262.99	244
457	5912	6106	2090.50	216.71	2457.30	47022.40	49479.70	245
615	6039	6134	2077.00	-54.50	2227.80	47197.40	49425.20	246
501	6047	6140	4687.12	32.25	6947.17	42510.28	49457.45	247
505	6084	6144	3164.50	93.45	3291.00	46259.90	49550.90	248
621	6050	6148	1952.00	-139.87	5103.13	44307.90	49411.03	249
622	6050	6148	1952.00	-139.87	6915.26	42355.90	49271.16	250
674	6070	6151	2767.87	-326.68	4694.33	44250.15	48944.48	251
518	5966	6161	1822.93	137.79	6655.05	42427.22	49082.27	252
537	6100	6161	4909.43	-65.37	11499.11	37517.79	49016.90	253
524	6067	6162	6679.00	-51.18	10665.50	38300.22	48965.72	254
673	6077	6168	4832.37	-66.57	10822.55	38076.60	48899.15	255
519	6086	6176	4097.25	-415.25	6457.99	42025.91	48483.90	256
791	6092	6189	2565.50	176.37	9199.86	39460.41	48660.27	257
973	6148	6197	4662.12	144.13	14006.11	34798.29	48804.40	258
863	6115	6205	2252.00	104.37	16362.48	32546.29	48908.77	259
786	6015	6207	1797.93	164.89	18325.30	30748.36	49073.66	260
781	5997	6221	3717.50	370.61	22413.41	27030.86	49444.27	261
991	6161	6226	7461.43	-910.43	28964.41	19569.43	48533.84	262
947	6140	6227	6914.12	-422.95	35455.58	12655.31	48110.89	263
773	6163	6228	4608.75	138.15	40202.48	8046.56	48249.04	264
987	6169	6234	8046.56	300.28	48549.32	.00	48549.32	265

TABLE 15

WRITER SIMULATION RESULTS[1]

Initial Capital	Maximum Value of Portfolio	Minimum Value of Portfolio	Maximum Less Minimum	Variation[2] of Total Capital Over Period[3]	$ Gain Over Period	% Gain Over Period	Number of Options Written
$ 5,000	$ 6,198	$ 5,000	$ 1,198	23.9%	$ 696	13.9%	8
10,000	11,221	10,000	1,221	12.2	698	7.0	14
15,000	16,777	15,000	1,777	11.8	495	7.3	24
20,000	21,732	19,854	1,878	9.4	154	0.8	28
25,000	27,563	25,000	2,563	10.0	516	2.1	35
30,000	31,506	29,159	2,347	7.8	-588	-2.0	37
35,000	36,964	34,162	2,802	8.0	-158	-0.5	47
40,000	41,328	39,381	1,947	4.9	703	1.8	53
45,000	46,967	44,008	2,959	6.6	1,723	3.8	55
50,000	51,419	48,431	2,988	6.0	281	0.6	66
55,000	56,530	52,643	3,887	7.1	-564	-1.0	72
75,000	78,213	73,006	5,207	7.0	-319	-0.4	100
100,000	104,618	99,041	5,577	5.6	3,007	3.0	119
150,000	158,309	147,360	10,949	7.3	1,135	0.8	163
200,000	211,617	198,049	13,568	6.8	-315	-.2	201
300,000	318,565	297,522	21,043	7.0	4,298	1.4	284
500,000	523,379	497,726	25,653	5.1	390	0.0	391

---

[1]This simulation assumes that the opportunities to write new option contracts on a particular day occur prior to the termination of existing contracts.

[2]$\text{VARIATION} = \frac{\text{MAX VALUE - MIN VALUE}}{\text{INITIAL CAPITAL}}$

[3]Period 4/22/60 to 1/30/62

TABLE 16

WRITER SIMULATION RESULTS[1]

Initial Capital	Maximum Value of Portfolio	Minimum Value of Portfolio	Maximum Less Minimum	Variation[2] of Total Capital Over Period[3]	$ Gain Over Period	% Gain Over Period	Number of Options Written
$ 5,000	$ 5,927	$ 5,000	$ 927	18.5%	$ 696	13.9%	8
10,000	11,482	10,000	1,482	14.8	1,181	11.8	15
15,000	16,777	14,418	2,359	16.3	-445	-3.0	25
20,000	21,809	19,235	2,574	12.8	-628	-3.1	27
25,000	27,563	25,000	2,563	10.0	2,376	9.5	31
30,000	31,506	28,982	2,524	8.4	-751	-2.5	37
35,000	36,964	34,274	2,690	7.7	-173	-0.5	42
40,000	41,837	39,084	2,753	6.9	-224	-0.6	52
45,000	46,890	43,002	3,888	8.6	-1,306	-2.9	61
50,000	51,644	48,111	3,533	7.1	-1,451	-2.9	67
55,000	56,497	52,931	3,566	6.5	-1,769	-3.2	71
75,000	76,791	72,603	4,188	5.6	-1,530	-2.1	92
100,000	104,134	97,910	6,224	6.2	-795	-0.8	113
150,000	157,351	147,031	10,320	6.9	578	-0.4	168
200,000	210,784	197,720	13,064	6.5	3,831	1.9	204
300,000	316,294	297,522	18,772	6.3	5,837	1.9	280
500,000	523,139	497,726	25,413	5.1	9,768	2.0	398

---

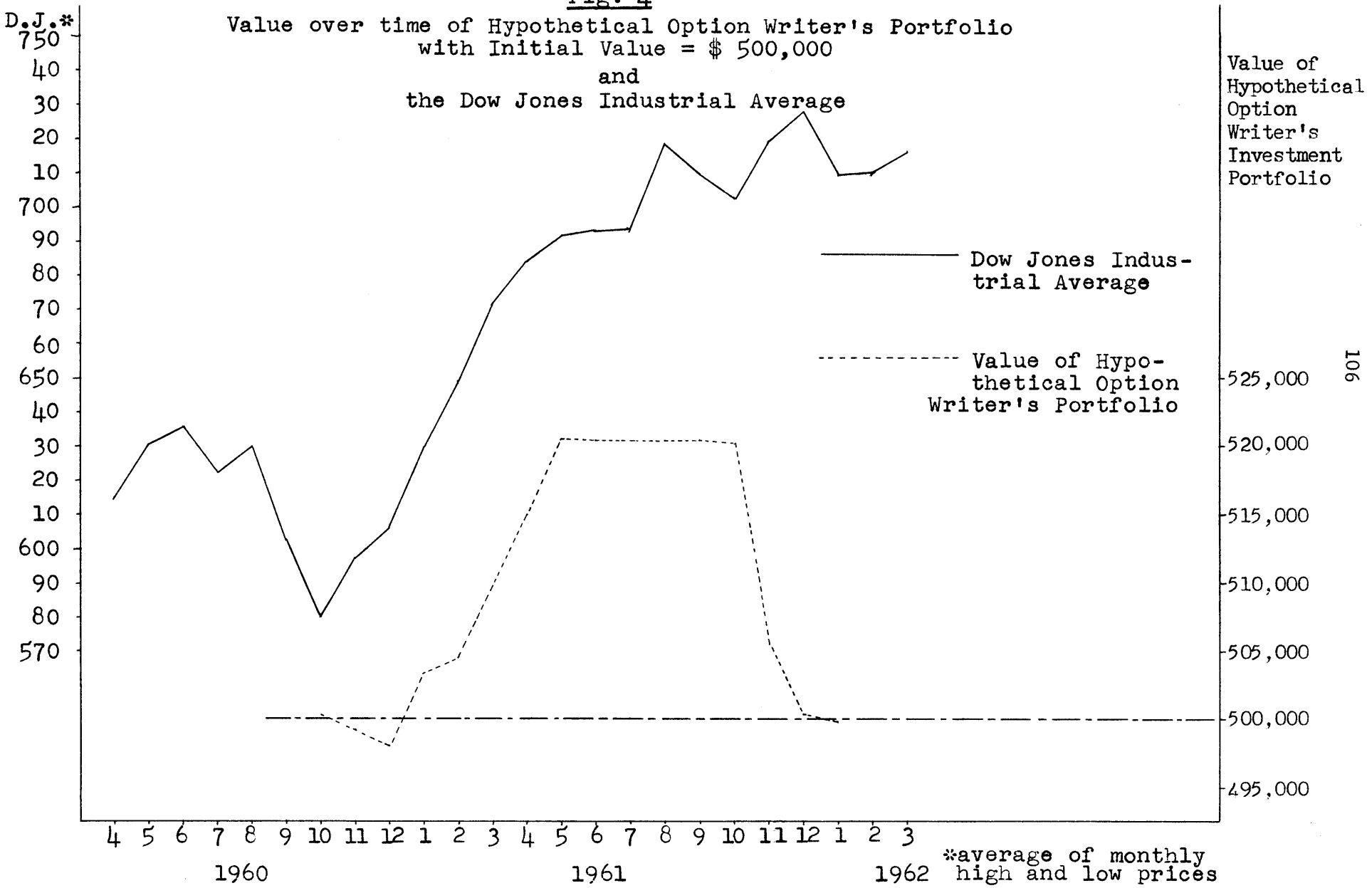
[1]This simulation assumes that the termination of existing contracts on a particular day through exercise or expiration occurs prior to the opportunity to write new contracts.

[2]$$\text{VARIATION} = \frac{\text{MAX VALUE - MIN VALUE}}{\text{INITIAL CAPITAL}}$$

[3]Period 4/22/60 to 1/30/62

Fig. 4

Value over time of Hypothetical Option Writer's Portfolio
with Initial Value = $ 500,000
and
the Dow Jones Industrial Average



CHAPTER VII

MAXIMIZING THE BENEFITS OBTAINABLE FROM PUT AND CALL OPTION WRITING

Net gains from put and call option writing must be discussed in light of techniques which can be used to enhance writing profitability: maximum use of leverage and full utilization of procedures allowed (or not specifically disallowed) under Federal income tax law. The use of option writing to protect against losses must also be kept in mind.

The Use of Leverage

The extent to which put and call option sales and stock purchased to hedge calls can be margined has been discussed in Chapter III.[1] The capital used to do this margining can itself be obtained via loans on other financial securities. The amount of leverage which can be introduced in such a situation is well illustrated by the following example which is based on the financial structure and operating policy of a firm presently in business.

An investment company could be formed which has the paid-up life insurance policies of its owners, with face value equal to $1,000,000 as its only assets.[2] The corporation should be able to borrow $900,000

---

[1] See p. 39.

[2] The firm on which this example is based was formed from the corporate shell of another company with a tax loss carry-forward. The procedure the firm uses to obtain leverage was outlined to the author by a reputable source familiar with the operations of the company.

on these policies. This capital could be used to purchase high quality securities which, in turn, could be deposited with a bank as collateral for a loan equal to 70 percent of their market value. After this loan was made, the company would have $900,000 invested in securities for their appreciation potential and have $630,000 in cash which it could use to hedge calls or margin puts. Over 50 percent leverage has been introduced into the financial structure of the firm. Even more leverage could be created by using minimum margins on option sales--but this introduces a much greater danger of the company's being wiped out through a large drop in the market prices of the stocks optioned.

Protection

One obvious example of option contract sales that were made purely for protection reasons can be found in the option data studied. Options 741 to 748 were 21-day calls on Brunswick Corporation. They were sold at a striking price of $35-1/8 when Brunswick's market price was $45-1/8 for a premium of $937.50. Since the price of the stock went up, the option writing profit program calculated that the writer lost $62.50 plus commission costs and transfer tax fees.

At $45-1/8, Brunswick was selling near its low for the year. The option writer, therefore, can be assumed to have sold the calls to protect his Brunswick stock from further loss. Any loss due to a further price decline in Brunswick stock would be compensated for by the premium he received from the sale of the call. This method of protecting stock from a price decline has the same effect as buying

a put on the stock. Unfortunately, the benefit obtained by the option writer from his protected Brunswick stock position cannot be quantitized. The option writing profit program uses actual cash flows to calculate profitability.

An analogous protected position could be taken by an option writer who is short on stock which he thinks may rise in price if certain events occur in the short term future. The option writer could sell a put well above the market to protect his position. Any loss on a rise in the price of the stock is compensated for by the premium received from the sale of the put. Protecting a short position by selling a put has the same effect as protecting the position by buying a call.

The advantages obtained from selling calls or puts to protect stock positions cannot be reflected in the profit results calculated. For the specific set of put and call options studied, only the Brunswick options cited above seem to have been purchased for protection reasons.

Tax Advantages Obtainable with Put and Call Options

The provisions of the Federal tax statutes make possible certain put and call operations which can greatly enhance option writing profitability. Under present income tax regulations, premiums received on options which expire are treated as ordinary income. If a call is exercised, the premium received by the writer is added to the striking price in arriving at the gain or loss on the sale of the stock optioned. If a put is exercised, the premium received by the option writer is deducted from the striking price in determining the

net cost basis of the security purchased.[3]

These tax regulations are the basis for some of the procedures outlined below[4] for creating capital gains and losses and recapturing a position with a minimum of market risk. The procedures are not specifically allowed by the Internal Revenue Service. It is believed that a consistent policy in the treatment of gains and losses, within the basic requirements of the law outlined above, is a sufficient basis for the legality of these procedures. Which of the procedures are actually used by option writers depends on their tax position.

Creating a Long Term Gain on Stock Held Less Than Six Months

The example given earlier in this chapter where calls were sold on Brunswick stock for protection reasons can be used to illustrate the creation of a long-term gain. Assume that the present market price of Brunswick stock at the time options 741 to 748 were sold was its high price for the year and that the option writer had held this stock just under six months. By selling a call exercisable well below the market, the option writer is protecting himself against a price fall and trying to equal the six-month capital gains holding period requirement.

---

[3]See Filer, op. cit., supra p. 2 , for a fuller discussion of these income tax regulations.

[4]Most of the information on these procedures was found in a pamphlet Functional Put and Call Writing published by Henry Blair and Company, Member, Put and Call Brokers and Dealers Association, Inc.

Creating a Long Term Gain and a Short Term Loss on Stock Used to Hedge a Call

Often a writer will sell a call option where the stock optioned appreciates considerably in value. Rather than deliver the stock he has used to hedge the option, he can buy the stock on the open market when the option is called, hold the stock he originally acquired to hedge the call until six months have elapsed, and claim a long term gain and a short term loss. For example, assume a six-month call on a stock is sold at a striking price of $50 for a premium of $600. The stock goes to $80 after six months and three days and the call is exercised. The writer could deliver the stock he is using to hedge the option and claim a $2400 short-term loss and sell the stock he held for six months for a $3000 long term gain. The net gain to the option writer from the second procedure is a function of his tax advantage from having a $600 long-term gain as opposed to a $600 short-term gain. The writer might also have some short-term capital gains which could be offset by the short-term capital loss.

Avoiding Wash Sale Provisions of the Tax Law

An individual may wish to claim a capital loss on stock he owns and wish to recapture his position in the stock at its present market price. He can avoid the tax law's wash sale provision by selling his stock and selling a 35-day put well above the market price of the stock. when the put is exercised on its expiration date, the required 31 days will have passed before a position in the stock was recaptured. The cost to the option writer is approximately equal to the commissions involved in the transactions.

Avoiding the Acceptance of a Large Dividend, Creating a Capital Gain or Loss and Recapturing the Position

An individual in a high tax bracket who owns a stock paying sizeable dividends which he would like to avoid receiving because of the large tax liability associated therewith would utilize the following procedure: first, the stock would be sold and the associated capital gain or loss taken. Then a put on the stock would be sold well above the market. When the stock sells 'ex-dividend', the put striking price is reduced by the amount of the dividend. When the stock is now put to the writer, his new cost basis is the original striking price less the dividend paid less the premium received. This method of reacquiring the stock is approximately equivalent to having sold the stock immediately before it went ex-dividend and reacquiring it immediately after it went ex-dividend. A question arises, however, as to why the individual would want to hold a position in a high dividend-paying stock to begin with. The only appropriate answer seems to be the capital protection provided by preferred stocks which are stocks that pay high dividends.

Creating Dividend Income and Short Term Loss With No Market Risk

Such a procedure is especially desirable for corporations, because of the 85 per cent exclusion on dividend income they enjoy. This procedure is a bit more complicated than those previously considered because it utilizes the fact that a stock is selling ex-dividend as a basis for claiming a capital loss. The corporation would buy a high dividend-paying stock and sell a call on the stock well below its market price. When the stock sells ex-dividend, the

corporation gains the dividend income and has a short-term capital loss on the stock approximately equal to the dividend paid. The premium received from the sale of the call option protects the corporation from any greater loss. If the corporation has short-term capital gains to offset, it has almost doubled its net income by the use of this procedure. For example, assume a corporation had a short-term gain of $5000 from which it normally would keep $2400 at a 52 per cent tax rate. If $5000 of short-term capital loss and $5000 of dividend income were added to the picture, the short-term gain would be offset and the corporation would keep 92 per cent of $5000, or $4600.

Creating a Short Term Gain and an Income Loss With a Minimum of Market Risk

An individual with short-term losses and long-term gains would benefit from this procedure. The method is exactly the opposite from the one for creating dividend income and short-term loss. A high dividend-paying stock is sold short and a put is sold on the stock at a price well above the market. When the stock sells ex-dividend, the option writer is charged with ordinary income loss for the dividends he must pay on his short position. His short-term gain equals the short sale proceeds less the cost basis of the stock put to him. This cost basis will equal the original put striking price less the dividends paid less the premium received. This procedure has minimum market risk because the option premium received protects the option writer against a sizeable decline in the stock price.

The procedures described demonstrate how important the tax

aspects of put and call option writing can be. Based on an examination of the put and call option data used in this study, the author concludes that the option writers considered have made only minimum use of these procedures.

CHAPTER VIII

SUMMARY AND CONCLUSIONS

Option Writer Profits

As a group, the option writers considered in the study had an average loss of 0.1 per cent, or $8 per option contract sold, on 851 contracts covering the period April 22, 1960, to January 30, 1962. Since duration and outcome are highly correlated, this result is somewhat negatively biased because of the exclusion of six-month options written during the last six months of the period under consideration. The correlation coefficient between duration and outcome, +.70, is significant at the 10 per cent level.

Some additional negative distortion is introduced into the profit result because the option contracts studied were concentrated toward the middle and end of the period under consideration. This concentration is not meant to imply that option sales were bunched during periods which were unprofitable for option writing. Rather, the activities of the option writing agents were not fully under way during the beginning of the period, which resulted in relatively fewer contracts being written at this time. Since this was a profitable time to write options using a calls-hedged, puts-margined strategy because it preceded a rising market, profit results of the option writing activity are somewhat understated.

While the tax benefits obtainable from put and call option writing can be substantial, no indication of tax-oriented option writing was found in the data used for this study. On some options, however, writers appear to have suffered small losses by selling calls well below the market in order to protect themselves against a large loss from a

fall in the price of the stock. Such benefits cannot be quantified and therefore are not included in the profit results. In future studies of actual option writing profitability, close contact with the option writers studied would be desirable to be sure that differences in profitability associated with tax and protection-oriented option writing are recognized.

If the option writers had kept the entire premiums received instead of paying their agents a 13.5 per cent commission, they would have had an average profit of 0.9 per cent, or $52 per option contract sold. Whether the services provided by the option writers' agent in obtaining higher premiums, maintaining contact with option dealers, and maintaining records for the option writers is worth an average of $60 per option contract sold, is an interesting question. Determining the extent of the difference, if any, between the premiums received by option writers acting independently and the writers' agent would be a fruitful area for further research. It could then be determined how much option writers are paying for the other services provided by their agent.

While option writers on the average lost money, 50 of the 76 writers considered in this study made a profit. Considering the writers' opportunity costs, however, 33 out of the 50 writers who made a profit and 22 of the 26 writers who lost money would have had higher profits by not writing options. The writer's opportunity cost is considered to be the price change on previously owned stock used to hedge call options, plus the earnings on other capital used to hedge and margin options, assumed invested at 5 per cent over the duration of the option contract.

No relationship has been found between profitability and the amount of capital invested in option writing. This study has shown that options can be written profitably with small amounts of capital devoted to the activity. Not enough evidence is available, however, to properly evaluate the risks of loss involved due to lack of diversification. While evidence of negative correlation between variation of one's initial capital and amounts of capital devoted to option writing has been found, the results of one of the two tests made is not sufficiently significant to draw any conclusions. It is possible, however, to lose 20 or 30 per cent of one's capital on the first option contract sold with capital on the order of magnitude of $5000 invested. The relative frequency of gains or losses with small amounts of capital invested in option writing has not been determined.

The Effect of Option Writing on the Writer's Investment Portfolio

An investor can use option writing to add stocks to or delete stocks from his portfolio of securities. The more intensive option writer, however, has his primary interest in option writing as an investment activity. The danger present for such an individual is that he will let his non-option-writing investments be affected by the option writing activity in such a manner as to weaken the quality level of his total security holdings. An investment portfolio of weaker quality level would be more subject to fluctuations in value due to changes in stock market price levels.

The option writers studied do not seem to have had their non-option-writing investments affected by the option writing activity. No significant difference in the quality level of stocks on which

they sold puts and the quality level of their investment portfolio could be found. Stock purchased to hedge calls which could be added to the writer's investment portfolio if not called also did not have a significantly different quality level.

The quality measure used in evaluating the effect of option writing on an investor's portfolio was devised by the Value Line Investment Service. This measure, based on historical stability in price behavior and growth in earnings and dividends, has a positive correlation with the direction of price movements in the stocks valued. It is the type of quality measure that option writers using a calls-hedged, puts-margined strategy could use to their advantage in determining the stocks on which to sell options.

It is interesting to note the high correlation coefficient between the quality rating and the average investment per option written in each quality group, .90. The significant correlation coefficient indicates that the higher quality stocks are usually the higher priced ones. This hypothesis is borne out by a positive correlation between option outcome and option striking price.

Option Writing Strategy

The calls-hedged, puts-margined strategy used by the option writers was the cause of the significant negative correlation at the 1 per cent level between option writing profitability classified by trade date and the movement of stock prices as represented by the Dow Jones Industrial Average. Thus, options written when the market is high show a loss and options written when the market is low show a profit under this strategy. Profitability during the low or high

periods, however, is positively correlated with the level of stock prices. There is a positive correlation at the 5 per cent level between the Dow Jones Average and the value of a hypothetical option writer's portfolio with initial capital of $500,000 devoted solely to option writing.

The option writers' strategy of hedging calls and margining puts was the most profitable "pure" strategy they could have used during the period studied. This strategy was best because the stock market had a predominantly upward trend over the option writing period considered. If there had been a predominantly downward trend in the stock market, a strategy of puts-hedged and calls-margined would probably have been preferred. This dependence on stock market movements suggests that in a period of selectivity in stock price advances, when the market itself is not moving up or down, a calls- and puts-margined strategy might yield the highest profit.

The desirability of writing straddles under a strategy where calls are hedged is questionable. If just margined puts and hedged calls were sold on different stocks, writers would eliminate the occurrence of having large double losses on straddles resulting from a sizeable drop in the price of the stock optioned. This substitution of puts and calls for straddles is equivalent to diversifying to reduce risk. The sale of a straddle, in effect a margined put and a hedged call, is equivalent to selling two margined puts on the same stock. Such a position offers no diversification at all.

Because large double losses from hedged straddles are automatically eliminated, a strategy where all options are initially

margined may be preferable to other strategies. Sizeable losses from severe price movements adverse to the option writer may still occur, however. Therefore, a "mixed" strategy, where all options are initially margined but hedged if sufficiently adverse price movements occur, may be the most desirable. Such a strategy would eliminate sizeable losses from severe price movements in any direction. If a price reversal of sufficient magnitude occurs, the hedged position could revert back to a margined position. For a mixed strategy to be the most effective strategy, the large losses eliminated would have to be greater than the losses caused by not having a hedged position.

The author, therefore, suggests investigation of the effects of mixed strategies as the main area for future research in the area of put and call option writing. By comparing how a writer using a mixed strategy would have done relative to the actual writing strategy used, perhaps using the data studied in this thesis, the merit of put and call option writing as an investment activity can be further evaluated.

This study has shown that option writing was not profitable as a whole over the 21-month period considered. Even though the actual profit result may be somewhat negatively distorted, the evidence indicates that option writing under the strategies investigated cannot be considered a desirable investment medium in its own right. Therefore, option writing may be useful only as an auxiliary activity in the management of an investment portfolio. Options can be written on stocks presently owned or desired and advantages due to the tax and protection features of option writing can be utilized.

Option writing cannot be considered an efficient investment medium unless investigation of techniques such as a mixed strategy indicate that profits can be made over an extended period of time.

The Option Buyer

The option buyer has been barely mentioned in this thesis. He naturally is the only reason for the existence of option writers. It would be quite desirable if option buyer characteristics could be determined, if only to understand how option writers could attempt to increase the demand for their writing services. The author attempted to make just such a study, but was unable to obtain cooperation from brokerage firms because of their reluctance to release the names of clients. A questionnaire the author designed is presented in Appendix 9 as a model for someone who may have better success at this venture.

APPENDIX I

APPENDIX 1

Column Key for the Put and Call Option Data Presented on the Following Pages

Column 1	Writer
2	Premium
3	Expiration date
4	Stock I. D. number
5	Trade date
6	Option type
7	Striking price
8	Market price on trade date (negative if writer went long)
9	Dealer
10	Endorser
11	Action taken
12	Date action taken
13	Market price on date action taken
14	Dividend
15	Difference call and put price if spread
16	Option I. D. number
17	Card number if more than 1 card associated with option

DATA CARD CØLUMN FIELDS.

1	2	3	4	5	6	7	8	9	10	11	12	13	14		15	16
1	675.00	6093	115	5902	3	40.000	39.875	1	1	0	6088	44.250	.40		1	1
1		6093	115	5902	3							44.125	.40	.00	1	2
1	950.00	6081	149	5890	5	33.250	33.250	2	1	5	6081	35.000	.75		2	1
1		6081	149	5890	5						6081	35.000	.75	.00	2	2
1	187.50	6065	9	5976	1	25.000	-24.875	3	1	2		26.125	.00		3	
1	312.50	6058	28	5867	3	15.250	15.250	4	1	0	6053	25.125	.27		4	1
1		6058	28	5867	3							27.125	.27	.00	4	2
1	500.00	6051	231	5858	3	29.250	29.250	3	1	0	6051	33.500	1.75		5	
1	256.25	6045	157	5854	1	25.125	-25.125	3	1	0	6045	29.875	.00		6	
1	131.25	6035	146	5941	1	13.750	-13.750	5	1	0	6035	12.125	.10		7	
1	250.00	5997	14	5806	1	25.000	-25.000	6	1	0	5974	31.250	.35		8	
1	300.00	5951	93	5856	3	23.875	-23.875	3	1	0	5951	25.250	.00		9	
1	412.50	5944	69	5755	1	35.000	-35.250	2	1	0	5937	42.250	.60		10	
1	425.00	5937	153	5743	1	37.500	-37.500	1	1	0	5848	43.375	.40		11	
1	300.00	5884	96	5798	3	26.500	-25.875	1	1	0	5863	30.625	.30		12	1
1		5884	96	5798	3							31.750	.30	.00	12	2
1	237.50	5847	221	5752	3	20.250	-20.250	2	1	0	5847	21.750	.31		13	
1	225.00	5828	231	5738	1	29.250	-29.250	3	1	2		25.750	.00		14	
3	250.00	6086	104	5895	1	28.125	-28.000	6	1	2		25.500	.00		15	
3	325.00	6035	212	5842	3	17.750	17.750	3	1	1	6035	17.875	.00		16	
3	325.00	6035	212	5842	3	17.750	17.750	3	1	1	6035	17.875	.00		17	
3	425.00	6035	41	5842	3	27.375	-27.375	2	1	0	6035	32.000	.50		18	
3	350.00	6032	69	5937	1	39.625	39.625	2	1	2		37.500	.00		19	
3	150.00	6025	33	5833	1	12.375	12.375	6	1	0	5940	15.750	.00		20	
3	237.50	6025	138	5916	1	50.000	50.000	6	1	2		43.375	.00		21	
3	350.00	6023	203	5933	3	27.250	27.250	6	1	0	5954	33.750	.00		23	1
3		6023	203	5933	3							28.000	.00	.00	23	2
3	350.00	6004	41	5939	3	35.875	-35.875	1	1	1	6004	31.250	.00		24	
3	400.00	5997	14	5806	3	25.000	-25.000	6	1	0	5974	31.250	.35		25	1

3		5997	14	5806	3						33.500	.70	.00	25	2
3	375.00	5995	104	5800	3	26.625	-26.625	3	1	0 5995	27.250	.38		26	
3	200.00	5946	41	5881	1	31.875	-31.875	2	1	0 5946	31.875	.12		27	
3	225.00	5937	241	5842	3	19.125	-19.125	3	1	0 5937	23.375	.30		28	
3	575.00	5923	138	5826	3	42.000	-42.000	6	1	7 5923	51.750	.12		29	
3	412.50	5920	69	5825	3	36.875	-36.875	2	1	1 5920	35.125	.60		30	
3	300.00	5923	120	5826	3	23.875	-23.875	6	1	0 5923	26.250	.20		31	
3	350.00	5902	59	5836	3	37.625	-37.625	3	1	0 5902	40.000	.35		32	
3	300.00	5902	227	5836	3	34.750	-34.750	3	1	0 5902	42.375	.12		33	
3	300.00	5871	229	5806	3	32.250	32.250	1	1	0 5842	36.250	.10		34	1
3		5871	229	5806	3						37.000	.10	.00	34	2
2	262.50	5995	122	5812	1	25.000	23.750	1	3	2	26.125	.00		35	
2	275.00	6030	29	5834	2	25.250	25.250	1	3	1 6030	18.750	.00		36	
2	325.00	5969	122	5777	1	21.125	21.125	7	2	0 5968	28.625	.00		38	
2	250.00	5906	128	5811	1	28.500	28.500	6	3	0 5906	32.875	.20		39	
2	250.00	5906	128	5811	1	28.500	28.500	6	3	0 5906	32.875	.20		40	
2	400.00	5882	29	5786	3	24.500	25.000	2	3	1 5882	24.000	.00		41	
2	250.00	5840	117	5773	2	35.375	35.375	8	2	1 5840	34.125	.30		42	
4	325.00	6053	2	5958	3	20.875	-20.875	3	1	1 6053	17.125	.10		43	
4	375.00	6042	174	5952	1	53.875	-53.750	1	1	2	48.500	.00		44	
4	375.00	6035	149	5939	3	32.250	-32.000	6	1	0 5965	38.250	.25		45	1
4		6035	149	5939	3						33.500	.25	.00	45	2
4	375.00	6028	140	5931	1	44.750	44.750	2	1	0 6028	47.250	.00		46	
4	375.00	6030	140	5938	1	42.625	-42.625	3	1	0 6030	47.375	.00		47	
4	475.00	6023	110	5933	3	36.750	-36.750	3	1	1 6023	29.875	.30		48	
4	300.00	6003	110	5941	1	35.000	-35.000	2	1	2	30.000	.00		49	
4	600.00	5995	32	5930	3	61.000	59.500	2	1	0 5995	67.250	.00		50	
4	350.00	6085	41	5988	3	32.875	-32.875	1	1	1 6022	29.250	.25		51	1
4		6085	41	5988	3						29.875	.25	.00	51	2
32	350.00	6085	41	5988	3	32.875	-32.875	1	1	1 6085	29.625	.50		52	
13	600.00	6092	225	5997	3	47.750	-47.750	2	1	1 6031	41.625	.40		53	1
13		6092	225	5997	3						35.375	.40	.00	53	2
13	300.00	6077	221	5981	3	26.750	-26.750	3	1	1 6077	25.000	.31		54	
13	275.00	6059	183	5868	3	17.375	17.375	2	1	0 6059	17.875	.60		55	
13	350.00	6070	85	5980	1	40.000	-40.000	5	1	2	31.750	.00		56	

13	412.50	6065	184	5874	1	37.125	-37.125	5	1	0	6034	39.250	1.18		57	
13	300.00	6064	193	5968	1	34.375	-34.375	2	1	2		28.625	.00		58	
13	300.00	6064	134	5969	3	21.750	-21.750	3	1	0	6060	26.875	.10		59	1
13		6064	134	5969	3							26.875	.10	.00	59	2
13	300.00	6063	134	5968	3	21.500	-21.500	3	1	0	6049	23.375	.10		60	1
13		6063	134	5968	3							26.500	.10	.00	60	2
13	275.00	6099	14	5905	1	26.500	26.500	3	1	0	5975	31.250	.00		61	
13	337.50	6067	140	5876	1	29.625	-29.625	5	1	0	6008	45.000	.00		62	
13	437.50	6039	41	5944	3	35.875	-35.875	1	1	1	6003	31.125	.25		63	1
13		6039	41	5944	3							31.750	.25	.00	63	2
13	400.00	6038	86	5973	6	43.750	-43.500	3	1	1	6038	41.250	.37		64	1
13		6038	86	5973	6							.000	.00	.50	64	2
13	450.00	6032	194	5937	1	55.750	-55.750	5	1	0	6032	55.500	.35		65	
13	625.00	6028	163	5931	3	46.000	-45.375	3	1	2		46.250	.00		66	
13	350.00	6025	210	5960	6	45.000	43.750	3	1	1	6025	41.250	.40		67	1
13		6025	210	5960	6							.000	.00	1.20	67	2
13	450.00	6021	110	5925	3	33.375	-33.375	3	1	1	6021	29.875	.30		68	
13	387.50	6021	120	5920	3	26.125	25.875	3	1	1	6021	24.125	.20		69	
13	325.00	6011	120	5916	3	26.125	26.125	4	1	1	6011	24.125	.20		70	
13	500.00	5996	163	5931	3	45.375	-45.375	3	1	0	5996	49.750	.00		71	
13	537.50	5996	148	5906	1	71.750	71.750	1	1	2		68.250	.00		72	
13	387.50	6021	120	5920	3	26.125	25.875	3	1	1	6021	24.125	.20		73	
13	700.00	5969	53	5874	3	63.000	63.000	4	1	0	5969	63.250	1.00		74	
13	375.00	5986	110	5955	3	33.750	-33.750	3	1	1	5986	30.500	.00		75	
13	325.00	5966	100	5871	1	39.500	-39.500	2	1	0	5965	51.125	.00		76	
13	425.00	5959	126	5864	3	38.250	38.250	2	1	0	5952	49.000	.40		77	1
13		5959	126	5864	3							47.750	.40	.00	77	2
13	412.50	5995	149	5899	3	34.625	34.625	6	1	0	5966	39.250	.25		78	1
13		5995	149	5899	3							38.250	.25	.00	78	2
13	412.50	5995	149	5899	3	34.625	34.625	6	1	0	5995	38.250	.25		79	
13	412.50	5986	32	5890	1	59.625	59.625	2	1	0	5986	67.625	.10		80	
13	450.00	5980	126	5885	3	41.375	41.375	2	1	0	5980	48.250	.40		81	
13	187.50	5969	28	5874	3	15.250	-15.250	6	1	0	5965	19.875	.15		82	1
13		5969	28	5874	3							19.875	.15	.00	82	2
13	250.00	5944	104	5912	3	29.500	-29.500	5	1	0	5944	30.750	.00		83	

13	425.00	5933	25	5868	3	56.125	56.125	2	1	0	5933	59.000	.35		84	
13	600.00	5930	194	5833	3	55.000	55.000	6	1	0	5930	57.625	.37		85	
13	375.00	5930	5	5833	3	35.500	35.000	6	1	0	5930	44.250	.00		86	
13	350.00	5923	210	5856	3	46.000	46.000	3	1	0	5923	46.500	.65		87	
13	262.50	5923	203	5827	3	22.000	21.875	3	1	0	5913	26.000	.52		88	1
13		5923	203	5827	3							28.000	.56	.00	88	2
13	506.25	5898	123	5833	3	73.250	73.250	1	1	0	5898	83.750	.75		89	
10	275.00	6087	241	6022	3	27.125	-27.125	3	1	0	6086	29.625	.00		90	1
10		6087	241	6022	3							28.875	.30	.00	90	2
10	500.00	6095	1	6030	3	68.125	-68.125	1	1	0	6088	72.375	.00		91	1
10		6095	1	6030	3							72.125	.45	.00	91	2
10	275.00	6078	102	5988	1	44.000	44.000	5	1	0	6071	47.750	.50		92	
10	800.00	6074	65	6009	3	84.750	-84.750	1	1	0	6066	101.250	.00		93	1
10		6074	65	6009	3							107.625	.50	.00	93	2
10	625.00	5986	232	5920	3	88.750	88.750	3	1	0	5986	89.375	.75		94	
10	412.50	6007	185	5917	1	60.875	60.875	3	1	0	5999	65.375	.75		95	
10	500.00	6025	21	5960	3	59.375	-59.375	3	1	1	6025	38.125	.50		96	
10	1600.00	6028	216	5933	5	97.625	97.625	2	1	5	6028	100.000	.65		97	1
10		6028	216	5933	5						6028	100.000	.65	.00	97	2
10	537.50	6035	188	5951	1	119.000	115.500	1	1	0	6032	132.500	.65		98	
10	1200.00	6035	188	5938	3	119.000	119.000	6	1	0	6028	129.875	.65		99	1
10		6035	188	5938	3							133.750	.65	.00	99	2
10	300.00	6056	47	5960	1	34.125	34.000	2	1	0	6056	36.375	.30		100	
10	500.00	6039	23	5944	3	73.125	73.125	1	1	0	6010	76.375	.75		101	1
10		6039	23	5944	3							75.375	.75	.00	101	2
10	700.00	6085	232	5987	3	89.375	-89.375	3	1	1	6085	85.500	.75		102	
16	950.00	6050	32	5960	3	68.500	-67.500	1	1	1	6050	56.875	.10		103	
16	1150.00	6039	219	5944	1	197.875	197.875	2	1	2		144.125	.00		104	
16	400.00	6024	149	5959	3	35.875	-35.875	2	1	2		36.000	.00		105	
16	400.00	6028	241	5937	3	23.375	-23.375	6	1	0	6028	29.000	.30		106	
16	400.00	6028	241	5937	3	23.375	23.375	6	1	0	6028	29.000	.30		107	
16	337.50	6021	120	5920	3	26.125	25.875	3	1	1	6021	24.125	.20		108	
16	387.50	6000	41	5903	3	35.875	-35.875	2	1	1	6000	31.750	.25		109	
16	525.00	6004	85	5909	3	34.750	-34.750	3	1	0	6004	36.000	.30		110	
16	437.50	5965	174	5898	3	50.000	-50.000	1	1	0	5948	53.875	.35		111	1

16		5965	174	5898	3						54.250	.35	.00	111	2
20	200.00	5785	159	5720	1	40.750	40.750	3	1	2	41.000	.00		112	
20	400.00	5786	230	5721	3	50.375	50.375	3	1	2	44.125	.00		113	
20	262.50	5790	14	5595	1	21.625	21.625	3	1	0 5790	24.250	.60		114	
20	500.00	5790	178	5597	2	66.000	66.000	1	1	1 5790	62.125	1.10		115	
20	218.75	5790	208	5695	1	26.125	26.125	1	1	2	24.750	.00		116	
20	900.00	5797	161	5603	1	85.250	85.250	2	1	2	67.875	.00		117	
20	900.00	5811	161	5615	1	85.250	85.250	2	1	2	74.250	.00		118	
20	625.00	5813	224	5619	1	47.125	47.125	9	1	2	36.375	.00		119	
20	275.00	5818	241	5623	1	25.500	25.500	2	1	2	17.625	.00		120	
20	400.00	5833	204	5738	3	35.125	35.125	3	1	0 5833	45.375	.37		121	
20	500.00	5834	149	5769	3	53.375	53.000	2	1	0 5833	65.000	.50		122	1
20		5834	149	5769	3						63.750	.50	.00	122	2
20	375.00	5784	100	5591	1	29.500	29.500	3	1	0 5784	33.875	.00		123	
20	500.00	5777	132	5682	1	64.500	64.500	9	1	2	52.750	.00		124	
20	362.50	5762	188	5666	1	71.750	71.750	3	1	0 5762	82.500	.00		125	
20	550.00	5769	149	5707	3	53.375	53.375	3	1	1 5769	53.125	.25		126	
20	550.00	6056	116	5864	1	52.000	-52.000	2	1	0 6046	62.125	.60		127	
20	250.00	5937	14	5743	1	22.250	22.250	3	1	2	28.250	.00		129	
20	600.00	5961	204	5769	3	39.250	39.250	3	1	0 5953	59.375	3.72		130	1
20		5961	204	5769	3						53.875	3.45	.00	130	2
20	231.25	5962	14	5770	1	21.875	21.875	3	1	0 5954	29.375	.70		131	
20	400.00	5997	14	5806	3	25.000	25.000	6	1	0 5974	31.250	.35		132	1
20		5997	14	5806	3						33.500	.70	.00	132	2
20	325.00	6004	46	5813	1	29.750	29.500	8	1	0 6003	39.500	.50		133	
20	287.50	5882	14	5787	3	24.375	24.375	3	1	0 5881	27.875	.35		134	1
20		5882	14	5787	3						27.750	.35	.00	134	2
20	237.50	5889	46	5794	1	28.625	28.625	9	1	0 5889	34.375	.25		135	
20	350.00	5916	71	5820	3	29.250	29.250	2	1	0 5910	34.625	.30		136	1
20		5916	71	5820	3						34.625	.30	.00	136	2
20	425.00	5955	150	5860	3	33.000	33.000	6	1	0 5955	34.625	.25		137	
20	362.50	5877	159	5812	3	45.875	44.875	1	1	0 5877	45.875	.25		138	
20	250.00	5923	178	5828	2	69.375	69.375	1	1	2	76.500	.00		139	
20	475.00	5912	58	5847	3	46.375	-46.375	3	1	1 5912	44.875	.00		140	
20	225.00	5920	150	5855	1	33.250	33.250	6	1	0 5920	36.500	.25		141	

20	325.00	5923	150	5857	3	32.500	32.500	2	1	0	5914	35.750	.25		142	1
20		5923	150	5857	3							37.250	.25	.00	142	2
20	375.00	5958	159	5891	3	47.750	-47.750	1	1	1	5958	45.250	.00		143	
20	950.00	6021	161	5955	3	91.500	91.500	3	1	1	6021	85.000	.00		144	
88	375.00	6007	104	5815	3	25.375	-25.375	3	1	0	6007	26.875	.38		145	
88	300.00	6011	120	5819	1	23.375	23.625	2	1	0	6011	24.125	.40		146	
88	143.75	5864	59	5818	1	36.000	34.500	9	1	0	5864	37.250	.00		147	
9	287.50	6087	96	6022	3	31.750	31.750	3	1	0	6087	32.500	.30		148	
9	287.50	6087	96	6022	3	31.750	31.750	3	1	0	6087	32.500	.30		149	
9	500.00	6092	6	6022	3	59.500	-59.500	3	1	0	6092	61.375	.45		150	
9	500.00	6092	6	6022	3	59.500	-59.500	3	1	0	6092	61.375	.45		151	
9	600.00	6092	51	6003	4	30.500	-30.750	1	1	4	6092	25.500	.25		152	1
9		6092	51	6003	4						6092	25.500	.25	.00	152	2
9	225.00	6087	111	6022	3	24.875	-24.875	3	1	2		24.625	.00		153	
9	225.00	6087	111	6022	3	24.875	-24.875	3	1	2		24.625	.00		154	
9	287.50	6087	101	6022	3	33.500	33.500	3	1	0	6087	37.875	.30		155	
9	287.50	6087	101	6022	3	33.500	33.500	3	1	0	6087	37.875	.30		156	
9	212.50	6087	77	6022	3	18.875	-18.875	3	1	0	6087	20.375	.00		157	
9	300.00	6087	59	6022	3	37.375	-37.375	3	1	1	6087	35.375	.35		158	
9	300.00	6087	59	6022	3	37.375	-37.375	3	1	1	6087	35.375	.35		159	
9	312.50	6087	180	6022	3	36.875	-36.875	3	1	1	6081	34.750	.40		160	1
9		6087	180	6022	3							34.625	.40	.00	160	2
9	312.50	6087	180	6022	3	36.875	-36.875	3	1	1	6087	34.625	.40		161	
61	650.00	5939	232	5748	1	70.125	70.125	3	1	0	5856	81.250	.75		162	
61	275.00	5891	206	5826	3	39.375	39.375	3	1	0	5882	45.875	.55		163	1
61		5891	206	5826	3							45.250	.55	.00	163	2
61	337.50	5888	206	5693	1	40.875	40.875	2	1	0	5888	44.875	1.70		164	
61	375.00	5882	34	5688	1	43.625	43.625	3	1	0	5882	44.125	1.80		165	
61	550.00	5896	216	5695	2	79.375	79.375	3	1	2		92.000	.00		166	
61	1100.00	5898	232	5703	3	83.000	83.000	9	1	0	5898	84.750	1.50		167	
61	437.50	5891	34	5826	5	39.875	39.875	3	1	5	5891	44.250	.00		168	1
61		5891	34	5826	5						5891	44.250	.00	.00	168	2
61	425.00	5868	232	5778	1	71.625	71.625	5	1	0	5868	80.750	.75		169	
61	500.00	5863	123	5798	3	70.000	70.000	1	1	0	5835	73.375	.00		170	1
61		5863	123	5798	3							80.375	.00	.00	170	2

61	600.00	5850	232	5657	2	81.250	81.250	2	1	2		79.375	.00		172	
61	775.00	5850	232	5658	1	81.000	81.000	3	1	2		79.375	.00		173	
61	625.00	5847	34	5651	3	44.750	44.750	3	1	1	5847	40.625	1.20		174	
61	425.00	5832	216	5765	6	77.375	75.375	3	1	0	5832	81.625	2.53		175	1
61		5832	216	5765	6							.000	.00	2.00	175	2
61	487.50	5832	123	5765	3	72.500	72.500	3	1	0	5832	72.000	1.75		176	
61	500.00	5832	123	5766	3	72.625	72.625	1	1	0	5832	72.000	1.75		177	
61	400.00	5829	206	5636	1	41.750	42.000	9	1	2		38.750	.00		178	
61	200.00	5804	34	5744	1	40.875	40.875	2	1	2		39.750	.00		179	
61	237.50	5797	206	5701	1	42.125	42.125	2	1	2		40.625	.00		180	
61	200.00	5783	34	5688	2	43.625	43.625	3	1	1	5783	40.375	.60		182	
61	375.00	5762	216	5670	2	72.125	72.125	3	1	2		75.125	.00		183	
9	425.00	6084	89	6017	3	43.875	43.875	1	1	0	6065	47.750	.00		184	1
9		6084	89	6017	3							52.750	.00	.00	184	2
9	425.00	6084	89	6017	3	43.875	43.875	1	1	0	6084	52.875	.00		185	
9	500.00	6086	129	6022	2	102.250	102.250	7	1	1	6044	98.375	.00		186	
61	387.50	6059	34	5868	1	42.625	42.625	3	1	0	6059	42.875	1.80		187	
61	387.50	6059	34	5868	1	42.625	42.625	3	1	0	6059	42.875	1.80		188	
61	462.50	6074	34	5884	1	44.125	44.125	9	1	0	6058	43.500	1.20		189	
9	287.50	6070	9	5973	3	24.000	-24.000	3	1	0	6070	25.625	.50		190	
9	375.00	6073	158	6008	3	40.250	-40.250	1	1	1	6049	38.000	.00		191	1
9		6073	158	6008	3							38.625	.00	.00	191	2
9	262.50	6058	101	5968	1	32.875	-32.875	5	1	0	6058	34.875	.30		192	
9	350.00	6049	77	5952	3	22.625	-22.625	6	1	1	6049	19.750	.10		193	
9	475.00	6046	59	5948	3	40.000	-40.000	7	1	1	6036	36.875	.35		194	1
9		6046	59	5948	3							35.125	.35	.00	194	2
9	475.00	6046	59	5948	3	40.000	-40.000	7	1	1	6036	36.875	.35		195	1
9		6046	59	5948	3							35.125	.35	.00	195	2
9	675.00	6042	180	5952	4	38.250	38.250	5	1	2		37.125	.40		196	
9	325.00	6038	59	5973	3	39.875	-39.875	3	1	1	6015	37.625	.35		197	1
9		6038	59	5973	3							36.625	.35	.00	197	2
9	275.00	6038	14	5973	3	31.000	31.000	3	1	0	6038	34.500	.35		198	
9	275.00	6038	51	5973	3	29.000	-29.000	3	1	1	6038	27.125	.25		199	
9	350.00	6042	77	5946	3	21.000	-21.000	3	1	1	6042	19.750	.10		200	
9	550.00	6028	90	5962	3	64.000	-63.750	3	1	1	6028	62.500	.50		201	

9	450.00	6030	13	5932	3	31.625	-31.625	2	1	1	6030	35.250	.25		202	
9	312.50	6025	77	5930	3	20.375	-20.375	4	1	1	6025	18.250	.10		203	
9	625.00	6025	123	5960	3	81.000	81.000	3	1	0	6025	84.375	.75		204	
61	300.00	6011	206	5819	1	38.500	38.500	3	1	0	6011	45.125	1.10		205	
9	212.50	6021	77	5926	1	21.000	21.000	2	1	2		19.375	.00		206	
9	350.00	6000	163	5910	1	52.000	51.500	6	1	2		48.625	.00		207	
9	500.00	5986	163	5920	3	51.000	50.875	3	1	1	5947	47.250	.00		208	1
9		5986	163	5920	3							47.625	.00	.00	208	2
61	400.00	5983	206	5888	3	44.875	-44.875	6	1	0	5954	47.375	.00		209	1
61		5983	206	5888	3							46.125	.55	.00	209	2
61	400.00	5983	206	5888	3	44.875	-44.875	6	1	0	5954	47.375	.00		210	1
61		5983	206	5888	3							46.125	.55	.00	210	2
9	600.00	5981	232	5916	3	85.500	85.500	6	1	0	5981	90.750	.75		211	
61	325.00	5979	34	5787	2	40.500	40.500	3	1	2		47.000	.00		212	
61	850.00	5972	34	5780	4	40.250	40.250	1	1	0	5946	48.125	1.20		213	1
61		5972	34	5780	4							46.500	1.80	.00	213	2
61	550.00	5966	216	5871	1	90.000	90.000	2	1	0	5965	103.375	.65		214	
61	400.00	5965	216	5870	2	90.875	90.875	6	1	2		103.375	.00		215	
61	300.00	5961	232	5769	2	70.125	76.125	2	1	2		86.250	.00		216	
61	575.00	5960	123	5895	3	84.250	84.250	1	1	1	5941	81.500	.00		217	1
61		5960	123	5895	3							81.625	.00	.00	217	2
61	700.00	5944	206	5752	4	40.500	40.500	1	1	0	5944	49.500	1.15		218	
61	700.00	5944	206	5752	4	40.500	40.500	1	1	0	5925	46.000	1.15		219	1
61		5944	206	5752	4							49.500	1.15	.00	219	2
61	1050.00	5930	232	5738	6	75.750	75.250	3	1	0	5891	84.375	1.50		220	1
61		5930	232	5738	6							85.375	1.50	.20	220	2
61	262.50	5923	34	5832	1	39.250	39.250	3	1	0	5905	46.250	.60		221	
61	375.00	5916	34	5849	3	42.625	42.625	3	1	0	5906	46.750	.60		222	1
61		5916	34	5849	3							45.625	.60	.00	222	2
61	375.00	5916	34	5849	3	42.625	42.625	3	1	0	5906	46.750	.60		223	1
61		5916	34	5849	3							45.625	.60	.00	223	2
61	600.00	5933	216	5868	3	90.000	90.000	2	1	0	5910	100.250	.65		224	1
61		5933	216	5868	3							97.500	.65	.00	224	2
29	350.00	6007	144	5910	3	26.000	26.000	2	1	0	6007	35.000	.12		225	
29	325.00	6008	104	5913	3	29.750	29.750	2	1	1	6008	26.750	.19		226	

29	450.00	6008	144	5913	3	26.500	26.500	2	1	0	6008	34.375	.12		227	
29	325.00	6011	104	5916	3	29.875	29.875	6	1	1	6011	26.375	.19		228	
29	325.00	6014	104	5917	3	29.250	-29.250	3	1	1	6014	26.125	.19		229	
29	275.00	5974	144	5909	3	23.875	23.875	3	1	0	5974	33.500	.00		230	
28	762.50	6081	138	5890	3	41.875	-42.000	1	1	3	5973	49.625	.00		231	1
28		6081	138	5890	3						6081	35.250	.37	.00	231	2
28	1000.00	5989	234	5798	3	60.250	-60.250	6	1	1	5989	51.125	.45		232	
28	400.00	5990	215	5799	3	14.750	14.625	2	1	1	5990	7.375	.00		233	
8	37.50	5990	215	5799	1	14.750	14.625	2	1	2		7.375	.00		234	
28	500.00	5945	130	5848	3	46.000	-45.500	3	1	0	5945	60.500	.25		235	
28	450.00	5944	87	5848	3	44.750	44.750	3	1	0	5944	48.000	.40		236	
28	475.00	5944	187	5849	3	46.750	47.000	1	1	0	5932	49.875	.12		237	1
28		5944	187	5849	3							49.125	.12	.00	237	2
28	425.00	5937	27	5871	3	36.625	36.625	2	1	0	5937	44.750	.15		238	
28	450.00	5937	187	5842	3	46.875	46.875	2	1	0	5927	49.625	.12		239	1
28		5937	187	5842	3							51.125	.12	.00	239	2
28	262.50	5895	215	5799	3	14.750	14.625	2	1	1	5895	13.125	.00		240	
28	475.00	5895	100	5798	3	38.375	-38.375	3	1	0	5892	44.250	.00		241	1
28		5895	100	5798	3							44.625	.00	.00	241	2
28	425.00	5870	27	5805	3	35.750	-35.750	2	1	2		36.750	.00		242	
30	950.00	6081	149	5890	5	32.750	32.750	2	1	5	6080	34.875	.50		243	1
30		6081	149	5890	5						6080	34.875	.50	.00	243	2
30	450.00	6134	149	5941	1	33.500	-33.500	5	1	0	6063	37.750	.25		244	
30	400.00	5997	14	5806	3	25.000	-25.000	6	1	0	5974	31.250	.35		245	1
30		5997	14	5806	3							33.500	.70	.00	245	2
30	400.00	6007	130	5910	1	55.000	-55.000	2	1	2		55.750	.00		246	
30	231.25	5962	14	5770	1	21.625	21.625	3	1	0	5954	29.375	.70		247	
30	500.00	5913	182	5818	3	54.500	-54.000	1	1	0	5912	59.000	1.68		248	1
30		5913	182	5818	3							59.500	2.33	.00	248	2
30	400.00	5913	59	5818	3	34.625	-34.625	3	1	0	5906	39.750	.35		249	1
30		5913	59	5818	3							38.000	.35	.00	249	2
30	350.00	5853	12	5787	1	69.125	-69.125	1	1	0	5814	75.500	.40		250	
30	375.00	5986	110	5926	3	33.750	-33.750	3	1	1	5986	30.625	.00		251	
30	375.00	5993	25	5961	2	54.750	55.000	2	1	2		56.000	.00		252	
30	550.00	6035	168	5842	2	60.750	60.750	9	1	2		79.250	.00		253	

30	500.00	6035	103	5968	6	73.125	-71.125	3	1	2		69.000	.00		254	1
30		6035	103	5968	6							.000	.00	4.00	254	2
32	250.00	6086	104	5895	1	28.125	-28.000	6	1	2		25.500	.00		255	
32	750.00	6065	18	5874	1	116.500	116.500	9	1	0	6065	123.125	1.72		256	
32	275.00	6072	149	5982	1	35.375	-35.375	1	1	0	6072	35.875	.25		257	
32	1175.00	6049	216	5856	3	88.750	-88.750	1	1	0	5944	101.375	.65		258	1
32		6049	216	5856	3							98.875	1.30	.00	258	2
32	650.00	6042	174	5952	3	53.875	-53.875	1	1	1	6042	48.625	.35		259	
32	300.00	6021	120	5828	1	23.750	23.750	2	1	2		23.875	.00		260	
32	800.00	5997	174	5806	3	42.625	42.625	4	1	0	5981	53.500	.70		261	1
32		5997	174	5806	3							53.625	.70	.00	261	2
32	825.00	5995	81	5804	2	113.000	113.000	3	1	1	5995	108.875	1.75		262	
32	375.00	5995	104	5800	3	26.625	-26.625	3	1	1	5995	27.250	.38		263	
32	850.00	5989	11	5924	3	82.125	-82.125	1	1	0	5952	97.250	.00		264	1
32		5989	11	5924	3							93.750	.00	.00	264	2
32	375.00	5987	41	5892	3	33.750	-33.750	6	1	1	5987	33.125	.25		265	
32	325.00	5965	41	5868	3	31.000	-31.000	2	1	0	5965	33.875	.25		266	
32	525.00	5951	108	5860	3	54.500	-54.500	1	1	0	5920	57.875	.55		267	1
32		5951	108	5860	3							57.625	.55	.00	267	2
32	412.50	5937	238	5840	3	49.625	-49.625	1	1	1	5925	44.000	.30		268	1
32		5937	238	5840	3							43.875	.30	.00	268	2
32	300.00	5920	120	5825	3	24.000	24.000	4	1	0	5919	25.750	.20		269	1
32		5920	120	5825	3							25.625	.20	.00	269	2
32	350.00	5910	34	5815	3	37.500	37.500	1	1	0	5891	44.250	.60		270	1
32		5910	34	5815	3							46.625	.60	.00	270	2
32	250.00	5902	104	5835	3	27.250	-27.250	3	1	0	5902	27.875	.19		271	
32	700.00	5895	234	5800	3	59.375	-59.375	2	1	1	5889	53.375	.15		272	1
32		5895	234	5800	3							51.000	.30	.00	272	2
32	250.00	5892	41	5827	3	28.250	-28.250	3	1	0	5883	32.375	.25		273	1
32		5892	41	5827	3							32.375	.25	.00	273	2
18	262.50	5980	56	5920	1	44.500	-44.500	3	1	2		43.875	.00		274	
46	362.50	5972	205	5875	3	27.625	-27.625	2	4	0	5972	47.500	.00		275	
46	275.00	5955	221	5890	3	26.000	26.000	2	4	2		27.125	.00		276	
45	350.00	5979	221	5787	3	20.125	20.125	1	1	0	5925	27.875	.62		277	1
45		5979	221	5787	3							25.625	.62	.00	277	2

45	200.00	5930	62	5833	1	30.125	30.000	6	1	0	5927	38.875	.20		278	
39	250.00	5960	140	5899	1	35.000	35.000	2	1	0	5960	42.000	.00		280	
39	300.00	5996	140	5906	1	36.500	36.500	3	1	0	5990	43.000	.00		281	
39	375.00	6087	140	5896	1	36.500	36.500	2	1	0	5927	44.000	.00		282	
48	212.50	5930	5	5833	1	35.500	35.000	6	1	0	5890	41.875	.00		283	
48	200.00	5940	20	5850	1	22.875	-22.500	1	1	0	5939	24.125	.00		284	
48	312.50	6067	151	5876	1	25.000	-25.000	5	1	0	6066	37.250	.50		285	
48	118.75	5881	215	5815	1	13.875	13.875	2	1	2		12.875	.00		286	
48	125.00	5881	215	5815	1	13.875	13.750	2	1	2		12.875	.00		287	
48	325.00	5885	100	5820	1	41.250	41.250	2	1	2		40.625	.00		288	
48	337.50	5892	100	5827	1	43.250	-43.250	2	1	0	5892	44.250	.00		289	
48	100.00	5881	236	5815	1	12.500	12.500	2	1	0	5878	14.625	.59		290	
48	125.00	5885	105	5819	1	16.250	-16.250	2	1	0	5884	19.375	.00		291	
48	112.50	5884	236	5819	1	13.750	13.750	2	1	0	5884	15.500	.62		292	
48	475.00	5911	124	5849	1	39.000	42.250	2	1	2		41.375	.00		293	
48	262.50	5916	130	5854	1	46.250	46.250	3	1	0	5910	56.000	.35		294	
49	275.00	6084	224	5987	1	30.375	30.375	3	1	2		21.375	.00		295	
49	750.00	6052	132	5986	4	73.750	73.750	1	1	4	6011	66.375	1.25		296	1
49		6052	132	5986	4						6081	64.875	1.25	.00	296	2
49	300.00	6035	44	5939	3	19.000	18.875	6	1	0	6035	19.750	.10		297	
67	200.00	6093	67	5902	1	11.125	-11.125	3	2	2		6.625	.00		298	
67	425.00	5979	221	5794	3	20.250	-20.750	2	1	0	5979	25.750	.62		299	
67	300.00	5972	33	5779	3	13.500	-13.500	7	1	0	5968	14.750	.69		300	1
67		5972	33	5779	3							14.625	.69	.00	300	2
67	225.00	5951	33	5856	3	13.500	-13.500	3	2	0	5951	14.875	.00		301	
67	187.50	5947	221	5857	1	24.750	-24.750	2	2	0	5947	27.500	.00		302	
67	137.50	5888	242	5695	1	8.875	8.875	1	1	2		7.125	.00		303	
67	137.50	5889	242	5695	1	8.875	8.875	1	1	2		7.125	.00		304	
67	175.00	5812	221	5721	1	20.375	-20.500	8	1	0	5812	21.000	.31		305	
67	275.00	5806	33	5612	3	13.000	-13.375	3	2	0	5805	13.250	.25		306	1
67		5806	33	5612	3							13.500	.25	.00	306	2
67	275.00	5806	33	5612	3	13.000	-13.375	3	2	0	5805	13.250	.25		307	1
67		5806	33	5612	3							13.500	.25	.00	307	2
63	537.50	6086	39	5895	1	48.375	48.375	2	1	0	6086	56.875	.30		308	
63	275.00	6092	127	6001	1	34.250	-34.250	2	1	0	6092	35.750	.26		309	

63	275.00	6099	14	5905	1	26.500	-26.500	3	1	0	5973	30.750	.00		310	
63	262.50	6077	198	5987	1	35.875	-35.875	1	1	2		31.125	.00		311	
63	187.50	6063	228	6003	1	23.875	-23.875	5	1	0	6063	28.125	.12		312	
63	400.00	5955	3	5890	1	87.500	-87.500	1	1	2		81.875	.00		313	
63	250.00	5955	64	5890	1	44.625	-44.625	1	1	0	5955	47.750	.00		314	
63	500.00	5974	155	5909	1	80.000	-80.000	2	1	0	5955	81.375	.15		315	
63	200.00	5973	104	5913	1	30.000	-30.000	6	1	2		28.250	.00		316	
63	337.50	5983	64	5923	1	49.000	-49.000	2	1	2		43.500	.00		317	
63	412.50	5986	32	5890	1	59.625	-59.625	2	1	0	5983	68.500	.10		318	
68	325.00	6049	208	5856	1	28.750	28.750	6	2	0	6049	30.375	.60		319	
68	450.00	5993	59	5898	3	39.625	39.625	1	2	0	5954	41.875	.00		320	1
68		5993	59	5898	3							39.875	.35	.00	320	2
68	500.00	5997	169	5806	3	24.000	24.000	4	2	1	5997	20.750	.40		321	
68	162.50	6007	207	5814	2	21.000	21.000	6	2	2		25.000	.00		322	
68	143.75	6000	207	5905	2	26.250	26.250	6	2	1	6000	25.250	.00		323	
68	143.75	6000	207	5905	2	26.250	26.250	6	2	1	6000	25.250	.00		324	
68	337.50	6000	169	5905	3	26.000	26.000	6	2	1	6000	20.750	.20		325	
68	337.50	6000	169	5905	3	26.000	26.000	6	2	1	6000	20.750	.20		326	
68	525.00	5790	178	5598	2	66.000	65.375	1	2	1	5790	62.125	1.10		327	
68	575.00	5847	91	5601	1	58.000	58.000	5	2	0	5841	61.125	.73		328	
68	350.00	5825	169	5632	1	29.625	29.625	5	2	2		22.875	.00		329	
68	412.50	5853	78	5660	1	25.125	25.125	1	2	2		23.000	.00		330	
68	412.50	5853	78	5660	1	25.125	25.125	1	2	2		23.000	.00		331	
68	525.00	5937	177	5744	2	63.500	63.250	1	2	1	5932	53.500	.60		332	
68	150.00	5944	228	5752	2	17.375	17.375	8	2	2		21.750	.00		333	
68	162.50	5958	169	5766	2	20.500	20.500	3	2	2		23.000	.00		334	
68	162.50	5958	169	5766	2	20.500	20.500	3	2	2		23.000	.00		335	
68	125.00	5968	228	5776	2	16.000	16.000	6	2	2		20.125	.00		336	
68	150.00	5790	139	5700	2	31.500	31.500	1	2	1	5790	26.750	.30		337	
68	125.00	5923	207	5828	2	23.750	23.750	2	2	2		25.250	.00		338	
68	275.00	5987	203	5892	3	24.500	24.500	6	2	0	5952	30.375	.00		339	1
68		5987	203	5892	3							32.125	.00	.00	339	2
68	275.00	5987	203	5892	3	24.500	24.500	6	2	0	5987	32.125	1.12		340	
68	312.50	5814	152	5749	1	76.250	76.250	1	2	0	5814	77.250	.40		341	
68	550.00	5814	154	5749	1	129.500	129.500	1	2	0	5814	130.250	.50		342	

68	237.50	5818	177	5752	2	61.250	61.250	8	2	1	5773	52.125	.00		343	
68	125.00	5827	59	5762	2	38.500	38.500	3	2	1	5822	34.750	1.39		344	
68	125.00	5827	59	5762	2	38.500	38.500	3	2	1	5827	34.750	1.39		345	
68	200.00	5840	178	5773	2	58.625	58.625	6	2	2		68.625	.00		346	
68	200.00	5840	178	5773	2	58.625	58.625	6	2	2		68.625	.00		347	
68	112.50	5847	37	5780	2	32.750	32.750	1	2	2		35.500	.00		348	
68	137.50	5895	37	5828	1	34.250	34.250	2	2	0	5895	37.250	.50		349	
68	250.00	5895	178	5828	1	69.375	69.375	1	2	0	5895	76.500	.00		350	
68	387.50	5965	59	5898	3	39.625	39.625	1	2	3	5955	41.500	.00		351	1
68		5965	59	5898	3						5947	37.875	.00	.00	351	2
68	912.50	6084	153	5892	3	47.750	47.750	4	2	0	6072	54.250	.80		352	1
68		6084	153	5892	3							55.500	.80	.00	352	2
74	175.00	5962	147	5867	1	20.875	20.875	4	5	0	5962	21.750	.00		353	
74	193.75	5983	10	5888	1	24.500	-24.500	2	5	0	5983	26.500	.30		354	
74	193.75	5983	10	5888	1	24.500	-24.500	2	5	0	5983	26.500	.30		355	
74	375.00	5986	173	5920	3	42.000	41.750	3	5	1	5986	39.500	.25		356	
79	325.00	6072	32	6007	1	63.250	-63.250	1	1	2		54.500	.00		357	
79	350.00	6077	26	5987	1	56.375	-56.375	1	1	2		52.250	.00		358	
79	212.50	6078	120	5983	1	26.750	-26.750	9	1	2		21.625	.00		359	
79	450.00	6072	161	6007	1	90.250	-90.250	1	1	2		88.625	.00		360	
79	450.00	6070	168	6008	1	70.000	-70.000	3	1	0	6070	79.625	.37		361	
79	375.00	6042	174	5952	1	53.875	-53.750	1	1	2		48.625	.00		362	
79	162.50	5944	104	5912	1	29.500	-29.500	5	1	0	5944	30.750	.00		363	
79	487.50	5959	155	5899	1	78.875	-79.875	6	1	0	5959	83.625	.00		364	
79	300.00	5961	200	5896	1	57.000	57.000	1	1	0	5955	57.500	.25		365	
79	412.50	5986	32	5890	1	59.500	-59.500	2	1	0	5986	67.250	.20		366	
79	500.00	6021	155	5959	1	84.000	-84.000	3	1	2		82.000	.00		367	
83	375.00	6071	137	5976	3	26.625	-26.625	3	1	1	6071	25.000	.00		368	
83	475.00	6056	131	5960	3	33.000	33.000	3	1	1	6056	30.750	.00		369	
83	500.00	6028	204	5966	3	51.250	-51.250	3	1	1	6028	43.750	.37		370	
83	200.00	5932	136	5902	2	49.750	49.750	9	1	2		66.125	.00		371	
83	250.00	5982	137	5917	3	20.625	-20.625	3	1	0	5973	28.500	.10		372	1
83		5982	137	5917	3							25.250	.10	.00	372	2
83	287.50	5990	105	5895	3	18.000	18.000	2	1	1	5990	15.750	.00		373	
83	525.00	6000	48	5903	1	72.125	72.125	2	1	0	5997	72.000	.20		374	

83	325.00	6001	130	5906	2	58.500	58.500	2	1	1	6001	58.500	.25		375	
84	1800.00	6092	226	5898	3	124.750	-124.750	1	1	0	6092	138.750	1.80		376	
84	1300.00	6092	118	5898	3	88.500	-88.500	1	1	0	6067	97.125	.50		377	1
84		6092	118	5898	3							104.375	.50	.00	377	2
84	1000.00	6092	72	5898	3	68.125	-68.125	1	1	0	6092	71.625	1.35		378	
84	1200.00	6049	152	5856	3	80.000	-80.000	1	1	0	6035	85.500	.80		379	1
84		6049	152	5856	3							86.250	.80	.00	379	2
84	900.00	6049	168	5856	3	60.625	-60.625	1	1	0	6045	78.375	.75		380	1
84		6049	168	5856	3							79.500	.75	.00	380	2
84	1375.00	6049	240	5856	3	102.000	-102.000	1	1	0	6046	153.875	.80		381	1
84		6049	240	5856	3							152.625	.80	.00	381	2
84	400.00	6056	104	5842	3	27.000	-27.000	3	1	1	6056	25.875	.38		382	
84	400.00	6056	104	5842	3	27.000	-27.000	3	1	1	6056	25.875	.38		383	
84	1400.00	6045	3	5854	3	94.625	-94.625	1	1	1	6045	90.000	.45		384	
84	550.00	6045	132	5854	1	62.250	-62.250	2	1	0	6042	66.250	1.25		385	
84	675.00	6042	116	5850	3	46.750	-46.750	2	1	0	6042	62.625	.60		386	
84	1162.50	6038	130	5847	5	46.250	-46.250	1	1	5	6031	55.125	.50		387	1
84		6038	130	5847	5						6031	55.125	.50	.00	387	2
84	625.00	6028	18	5836	1	101.500	101.500	2	1	0	6028	118.250	3.95		388	
84	625.00	6028	18	5836	1	101.500	101.500	2	1	0	6028	118.250	3.95		389	
84	500.00	6021	100	5827	1	43.250	43.250	3	1	2		40.375	.00		390	
84	850.00	6021	100	5827	3	43.500	43.250	4	1	0	5959	52.375	.00		391	1
84		6021	100	5827	3							40.750	.00	.00	391	2
84	1012.50	6007	216	5910	3	98.875	-99.000	2	1	0	6004	106.125	.65		392	1
84		6007	216	5910	3							105.500	.65	.00	392	2
84	375.00	5993	25	5961	2	54.750	55.000	2	1	2		56.000	.00		393	
84	400.00	5965	18	5870	1	112.875	112.875	1	1	0	5932	119.000	3.05		394	
84	400.00	5965	18	5870	1	112.875	112.875	1	1	0	5940	125.500	3.05		395	
84	300.00	5951	57	5856	3	32.625	-32.625	3	1	0	5951	35.750	.60		396	
84	562.50	5927	18	5832	3	95.625	96.000	3	1	0	5920	112.625	3.05		397	1
84		5927	18	5832	3							114.000	3.05	.00	397	2
84	350.00	5902	59	5836	3	37.500	-37.500	3	1	0	5902	40.000	.35		398	
86	225.00	6066	2	5939	1	19.750	19.750	2	1	2		18.125	.00		399	
23	400.00	6085	60	5990	3	35.125	-35.125	3	1	1	6085	30.000	.30		400	
23	400.00	6085	54	5990	3	31.750	-31.750	3	1	2		32.000	.00		401	

34	375.00	6092	194	6032	1	55.500	-55.500	2	1	0	6073	62.125	.35		402	
23	450.00	6078	102	5988	3	44.000	-44.000	5	1	0	6078	46.125	.50		403	
5	400.00	6079	104	5888	3	28.375	28.375	6	1	1	6079	25.500	.38		404	
5	325.00	6067	79	5876	1	29.375	-29.375	3	1	2		28.125	.00		405	
50	325.00	6079	32	6014	1	60.750	-60.750	1	1	2		60.000	.00		406	
50	187.50	6063	228	6003	1	23.875	-23.875	5	1	0	6063	28.125	.12		407	
50	700.00	6066	16	6001	3	76.000	-76.000	1	1	1	6066	67.250	.50		408	
21	250.00	5997	15	5806	1	18.750	19.125	6	2	0	5997	18.250	.90		409	
58	1000.00	6056	195	5863	1	86.000	85.500	2	1	0	6056	98.000	.30		410	
28	300.00	6018	212	5826	3	18.000	17.875	1	1	1	6017	17.625	.00		411	1
28		6018	212	5826	3							17.875	.00	.00	411	2
21	200.00	6007	40	5814	1	16.625	16.625	6	1	0	6000	18.750	.50		412	
59	200.00	5986	221	5793	1	20.625	-20.625	1	1	0	5986	27.000	.62		413	
76	250.00	5979	165	5786	3	14.875	14.875	1	5	0	5979	29.500	.20		414	
64	350.00	5979	221	5786	3	20.375	20.375	1	1	0	5953	26.750	.62		415	1
64		5979	221	5786	3							25.625	.62	.00	415	2
78	237.50	5979	128	5882	1	30.250	30.250	2	1	0	5965	37.125	.15		416	
78	237.50	5979	128	5882	1	30.250	30.250	2	1	0	5979	37.500	.15		417	
81	262.50	5979	221	5787	1	20.250	20.250	2	1	0	5979	25.750	.62		418	
78	650.00	5976	142	5856	3	59.000	59.000	3	1	0	5976	72.000	.50		419	
81	250.00	5997	14	5806	1	25.000	24.875	6	1	0	5974	31.250	.35		420	
7	400.00	5972	238	5780	1	46.625	46.625	1	2	2		44.375	.00		421	
60	262.50	5969	104	5874	3	27.000	27.000	6	1	0	5969	28.500	.19		422	
46	275.00	5968	205	5876	1	27.125	27.125	5	4	0	5968	46.750	.00		423	
59	412.50	5968	69	5776	1	35.125	35.125	2	1	0	5968	46.250	.60		424	
76	500.00	5909	70	5842	3	53.750	-53.750	3	5	0	5909	54.625	.50		425	
60	337.50	5948	218	5853	3	33.000	33.000	3	1	0	5948	38.250	.15		426	
64	212.50	6010	35	5818	1	14.125	-14.125	3	1	0	5955	21.875	.90		427	
56	350.00	5898	130	5832	3	45.375	45.375	3	1	0	5895	51.625	.00		428	1
56		5898	130	5832	3							52.000	.25	.00	428	2
56	350.00	5898	130	5832	3	45.375	45.375	3	1	0	5898	52.000	.00		429	
52	187.50	5890	171	5825	3	19.375	19.375	3	1	0	5875	19.875	.20		430	1
52		5890	171	5825	3							20.625	.20	.00	430	2
8	575.00	5832	119	5638	1	57.250	57.250	3	1	0	5832	63.375	.90		431	
42	287.50	5867	221	5671	1	20.500	-20.500	5	1	0	5860	25.000	.62		432	

5	312.50	5968	41	5903	3	35.875	-35.875	2	1	1	5968	33.500	.25		433
23	287.50	6084	2	5988	3	20.000	-20.000	3	1	1	6084	17.375	.15		434
23	600.00	6084	100	5988	3	46.500	-46.500	2	1	1	6084	34.500	.00		435
89	250.00	6021	113	5926	1	32.750	-32.750	2	1	0	6021	35.750	.37		436
89	175.00	6050	77	5955	2	23.750	23.750	4	1	1	6050	19.125	.10		437
49	275.00	6098	114	6007	1	39.375	-39.375	6	1	2		37.625	.00		441
50	425.00	6098	39	6006	1	55.750	-55.750	1	1	0	6098	57.875	.10		442
10	375.00	6098	220	6001	3	30.875	-30.875	3	1	0	6098	27.875	.30		443
63	762.50	6070	161	5980	1	96.500	-96.500	3	1	2		89.125	.00		444
83	275.00	6014	83	5917	3	17.625	17.625	3	1	0	6014	18.875	.00		445
83	425.00	6014	128	5917	3	32.250	-32.250	3	1	1	6014	32.250	.07		446
29	225.00	6137	222	5944	1	13.625	13.625	3	1	2		9.875	.00		450
45	187.50	6126	233	5932	2	16.750	17.000	6	1	1	6126	14.500	.25		451
45	187.50	6126	233	5932	2	16.750	17.000	6	1	1	6126	14.500	.25		452
45	187.50	6126	233	5932	2	16.750	17.000	6	1	1	6126	14.500	.25		453
21	275.00	6126	40	5931	1	21.000	21.000	2	2	2		20.875	.40		454
29	237.50	6120	222	5926	1	14.500	14.500	2	1	2		9.500	.00		455
45	725.00	6112	155	5918	2	80.750	80.750	2	1	1	6112	73.250	.33		456
29	300.00	6106	192	5912	3	11.750	11.750	3	1	0	6106	13.500	.00		457
29	300.00	6106	192	5912	3	11.750	11.750	3	1	0	6106	13.500	.00		458
29	300.00	6106	192	5912	3	11.750	11.750	3	1	2		13.500	.00		459
29	300.00	6106	192	5912	3	11.750	11.750	3	1	2		13.500	.00		460
29	300.00	6106	192	5912	3	11.750	11.750	3	1	2		13.500	.00		461
29	200.00	6106	222	5912	1	11.125	11.125	2	1	2		9.750	.00		462
29	550.00	6105	144	5909	3	23.500	23.500	2	1	0	6105	26.250	.25		463
29	550.00	6105	144	5909	3	23.500	23.500	2	1	0	6105	26.250	.25		464
29	550.00	6105	144	5910	3	26.000	26.000	2	1	2		26.250	.25		465
18	300.00	6097	107	5905	3	14.750	14.750	6	1	1	6097	13.125	.20		466
45	387.50	6097	160	5905	1	34.000	34.000	5	1	2		28.625	.50		467
82	700.00	6096	30	6002	3	40.375	40.375	4	5	1	6096	33.000	.00		468
53	1000.00	6102	226	5899	1	124.750	124.750	1	1	0	6102	138.500	2.70		469
45	650.00	6102	173	5898	3	42.500	42.500	1	1	1	6102	34.750	.50		470
45	325.00	6102	233	5898	3	14.625	14.625	1	1	1	6102	13.125	.25		471
4	475.00	6140	120	5945	3	28.375	28.250	7	1	1	6140	18.125	.40		472
4	337.50	6140	120	5945	1	28.250	28.250	5	1	2		18.125	.40		473

4	275.00	6140	2	5946	1	19.250	-19.250	2	1	2		16.000	.30		474	
13	250.00	6158	190	6063	3	20.875	-20.875	3	1	0	6158	24.500	.15		475	
13	425.00	6137	112	5944	3	24.375	24.375	1	1	0	6120	25.250	.55		476	1
13		6137	112	5944	3							25.125	.55	.00	476	2
13	225.00	6148	28	6058	1	26.500	-26.500	3	1	2		22.000	.15		477	
13	225.00	6148	28	6058	1	26.500	-26.500	3	1	2		22.000	.15		478	
16	725.00	6140	219	6080	1	141.500	141.500	2	1	2		99.000	.00		479	
16	750.00	6143	219	6078	1	141.500	141.500	1	1	2		101.500	.00		480	
16	400.00	6154	149	5959	1	35.875	-35.875	2	1	2		26.500	.75		481	
16	287.50	6098	104	5904	1	27.875	27.875	2	1	2		25.000	.38		482	
16	475.00	6119	28	5924	3	20.000	-20.000	5	1	0	6070	25.500	.30		483	1
16		6119	28	5924	3							22.750	.30	.00	483	2
16	400.00	6116	149	6056	3	36.375	-36.375	2	1	1	6116	32.625	.25		484	
30	537.50	6126	133	5930	1	44.000	-44.000	9	1	2		39.000	1.00		485	
30	475.00	6112	210	5918	1	46.250	-46.250	3	1	2		41.375	.80		486	
30	725.00	6106	239	5912	3	44.375	-44.000	1	1	0	6085	48.875	.80		487	1
30		6106	239	5912	3							49.000	1.20	.00	487	2
30	900.00	6107	70	5913	3	53.500	53.500	6	1	1	6107	50.000	1.00		488	
30	400.00	6105	201	5909	3	22.125	-22.125	3	1	0	6105	26.750	.58		489	
45	250.00	6126	196	5931	2	29.500	29.500	6	1	1	6126	24.000	.00		490	
45	250.00	6126	196	5931	2	29.500	29.500	6	1	1	6126	24.000	.00		491	
49	825.00	6095	132	6000	4	73.000	73.000	6	1	4	6095	69.125	.63		493	1
49		6095	132	6000	4						6095	69.125	.00	.00	493	2
49	475.00	6112	132	6021	1	64.375	64.375	2	1	0	6112	65.000	.63		494	
83	425.00	6112	130	6015	3	33.250	-33.250	2	1	1	6112	25.625	.03		495	
83	425.00	6112	83	5918	3	18.000	17.375	4	1	0	6112	21.500	.00		496	
83	500.00	6105	30	5911	1	36.750	36.750	9	1	2		33.125	.00		497	
83	500.00	6105	30	5911	1	36.750	36.750	9	1	2		33.125	.00		498	
5	250.00	6133	149	6043	1	33.875	-33.875	6	1	0	6133	35.500	.25		499	
41	300.00	6137	141	6089	1	57.500	-57.500	7	1	0	6137	63.125	.55		500	
33	275.00	6140	57	6047	1	49.250	49.250	3	1	2		46.750	.88		501	
43	425.00	6142	61	6051	1	59.500	-59.500	2	1	2		55.250	.40		502	
33	375.00	6143	45	6078	1	66.625	66.625	1	1	0	6143	67.750	.00		503	
62	250.00	6126	163	6094	1	54.875	-54.875	2	1	2		50.000	.50		504	
70	200.00	6144	68	6084	1	33.375	-33.375	1	1	0	6144	38.625	.00		505	

57	512.50	6148	38	6088	1	82.125	-82.125	2	1	0	6140	96.000	.00		506	
40	500.00	6148	100	6053	3	42.875	-42.875	2	1	1	6087	34.000	.00		507	1
40		6148	100	6053	3							26.500	.00	.00	507	2
9	675.00	6161	162	6065	3	74.500	-74.500	3	1	1	6161	70.500	.60		508	
9	350.00	6172	125	6081	2	52.500	52.500	8	1	2		52.000	.60		509	
9	250.00	6169	77	6078	3	20.250	20.125	2	1	2		20.750	.13		510	
9	550.00	6162	51	5968	3	29.500	-29.500	3	1	1	6162	26.375	.50		511	
9	312.50	6163	9	5972	1	22.875	-22.875	6	1	2		20.500	.75		512	
9	425.00	6161	9	5965	3	21.500	-21.500	2	1	1	6161	20.375	.75		513	
9	350.00	6126	51	5932	1	28.000	-28.125	5	1	2		23.500	.50		514	
9	312.50	6126	9	5930	1	22.500	-22.500	5	1	2		21.750	.50		515	
9	162.50	6112	9	6021	2	24.500	24.500	6	1	1	6108	19.625	.25		516	
84	875.00	6169	216	5975	1	102.750	102.750	1	1	0	6169	106.750	1.80		517	
4	262.50	6161	28	5966	1	20.250	-20.500	6	1	0	6161	25.500	.30		518	
63	350.00	6176	12	6086	1	44.000	-44.000	2	1	2		37.000	.23		519	
86	400.00	6162	28	5968	3	19.875	-19.875	3	1	0	6162	24.500	.30		520	
22	212.50	6163	28	6071	1	26.375	-26.125	3	1	2		24.500	.15		521	
3	412.50	6168	250	6071	3	35.375	-35.375	3	1	0	6168	44.750	.22		522	
75	275.00	6154	251	6088	1	45.375	-45.375	2	1	2		46.375	.00		523	
54	400.00	6162	213	6067	3	35.125	35.125	2	1	1	6162	33.250	.25		524	
62	550.00	6162	163	6067	3	54.250	54.250	2	1	1	6162	50.875	.50		525	
46	625.00	6094	234	5903	1	54.500	54.500	3	4	2		38.000	.30		526	
74	475.00	6092	56	5899	1	43.250	-43.250	2	6	0	6092	52.625	.50		528	
10	725.00	6175	94	5979	1	86.500	-86.500	1	1	0	6164	110.000	1.50		530	
10	875.00	6169	216	5975	1	102.250	102.250	1	1	0	6169	106.750	1.80		531	
13	275.00	6097	14	5905	1	26.500	26.500	3	1	0	5975	34.625	.00		532	
13	400.00	6119	189	5925	6	24.875	24.125	2	1	2		23.250	.75		534	1
13		6119	189	5925	6							.000	.00	2.70	534	2
9	162.50	6161	253	6100	2	50.500	50.500	5	1	1	6161	48.875	.00		537	
9	300.00	6112	169	6015	3	20.000	-20.000	1	1	1	6112	19.000	.20		539	
9	425.00	6105	158	6010	3	40.125	40.125	3	1	1	6105	38.250	.40		540	
68	400.00	6174	159	6109	3	54.625	54.625	1	2	0	6157	55.250	1.35		541	1
68		6174	159	6109	3							55.250	1.35	.00	541	2
40	525.00	6172	12	6077	3	43.750	43.750	3	1	1	6172	37.625	.23		542	
16	775.00	6172	219	6107	1	119.000	119.000	9	1	2		109.000	.00		543	

49	450.00	6151	38	6116	1	88.000	-88.000	2	1	0	6151	95.750	.00		544	
181	312.50	6168	12	6107	1	43.000	-43.000	3	1	2		38.000	.23		545	
1	337.50	6137	51	5944	1	29.375	-29.375	2	1	2		25.375	.50		547	
1	287.50	6133	77	5939	1	21.250	-21.375	2	1	2		18.375	.22		548	
1	525.00	6147	77	5952	3	22.625	-22.625	3	1	1	6147	19.625	.23		549	
3	400.00	6140	69	6044	3	35.500	-35.500	3	1	0	6137	36.750	.30		550	1
3		6140	69	6044	3							36.875	.30	.00	550	2
3	350.00	6154	28	6067	3	26.250	-26.125	1	1	1	6154	23.250	.15		551	
3	525.00	6119	120	5924	3	27.375	-27.375	6	1	1	6102	20.000	.40		552	1
3		6119	120	5924	3							20.000	.40	.00	552	2
3	300.00	6107	28	6017	3	21.250	-21.000	6	1	0	6107	23.500	.15		553	
3	425.00	6113	69	5919	1	35.500	35.500	6	1	2		33.125	.60		554	
3	500.00	6106	85	5912	1	38.000	-38.000	3	1	2		29.500	.50		555	
16	850.00	6114	84	5920	3	35.000	-35.000	2	1	1	6114	33.000	.30		556	
16	300.00	6107	28	6017	3	21.250	-21.125	6	1	0	6107	23.500	.15		557	
16	325.00	6105	31	5910	3	16.500	16.500	6	1	1	6105	14.125	.00		558	
83	600.00	6133	29	5937	3	24.875	24.875	4	1	1	6133	14.000	.00		559	
83	312.50	6119	28	6067	3	26.500	-26.000	1	1	1	6119	22.500	.15		560	
83	550.00	6113	58	5919	1	46.250	46.250	3	1	2		32.625	.00		561	
83	750.00	6112	82	5918	3	35.000	35.000	4	1	1	6112	12.000	.00		562	
83	625.00	6112	130	6015	3	54.375	-54.375	2	1	1	6112	53.000	.25		563	
83	800.00	6112	131	5916	3	40.500	40.500	4	1	1	5953	27.000	.00		564	1
83		6112	131	5916	3							26.750	.00	.00	564	2
84	1112.50	6119	237	5925	3	78.750	-78.750	1	1	2		78.500	.75		565	
84	1800.00	6112	81	5916	3	114.750	-114.750	4	1	1	6081	95.500	.90		566	1
84		6112	81	5916	3							98.500	1.80	.00	566	2
5	225.00	6116	149	6056	1	36.375	-36.375	2	1	2		33.000	.25		569	
5	225.00	6116	149	6056	1	36.375	-36.375	2	1	2		33.000	.25		570	
72	287.50	6119	56	6058	1	48.250	-48.250	2	1	0	6119	54.625	.25		571	
9	400.00	6114	34	5920	1	46.875	46.875	3	1	2		40.625	1.20		572	
9	250.00	6095	51	6000	1	28.625	-28.625	6	1	2		24.750	.25		575	
3	275.00	6116	138	6018	1	42.000	42.500	6	8	2		32.250	.12		576	
4	400.00	6133	149	5938	1	33.125	31.125	9	1	0	6130	35.500	.50		577	
4	650.00	6147	151	5952	3	33.625	-33.625	6	1	0	6135	34.500	.50		578	1
4		6147	151	5952	3							34.500	.50	.00	578	2

4	800.00	6126	211	5961	3	39.875	39.875	2	1	1	6126	36.625	.00		579	
4	300.00	6119	41	6052	3	31.750	-31.750	1	1	1	6119	30.625	.25		580	
4	575.00	6126	106	5932	1	66.000	63.500	5	1	0	6080	77.750	.50		581	
4	306.25	6133	114	5933	2	37.000	36.750	3	1	2		36.500	1.59		582	
4	306.25	6133	114	5933	2	37.000	36.750	3	1	2		36.500	1.59		583	
4	725.00	6137	24	5944	3	45.625	-45.625	6	1	1	6137	44.375	.70		584	
4	450.00	6140	104	5946	3	30.875	-30.875	6	1	1	6130	25.375	.38		585	1
4		6140	104	5946	3							25.625	.38	.00	585	2
4	825.00	6150	232	6060	3	88.375	-88.375	5	1	1	6150	77.000	.00		586	
4	500.00	6140	85	5946	1	37.875	-37.875	2	1	2		31.000	.60		587	
4	450.00	6141	104	5948	3	31.125	-31.125	6	1	1	6128	25.250	.38		588	1
4		6141	104	5948	3							25.375	.38	.00	588	2
10	375.00	6109	217	6044	3	50.000	-50.000	3	1	0	6077	58.750	.40		589	1
10		6109	217	6044	3							51.125	.40	.00	589	2
10	906.25	6178	252	6114	3	119.000	-119.000	1	1	0	6175	132.000	.60		590	1
10		6178	252	6114	3							137.375	.60	.00	590	2
10	375.00	6109	217	6044	3	50.000	-50.000	3	1	2		49.250	.40		591	
10	850.00	6128	188	6036	1	135.000	-135.000	3	1	0	6086	144.250	.75		592	
10	500.00	6102	197	6037	3	63.375	-63.375	1	1	1	6102	60.500	.45		593	
10	400.00	6133	206	5938	1	46.750	46.750	3	1	2		44.000	1.10		595	
10	600.00	6105	185	5909	1	65.625	65.625	5	1	2		62.000	1.50		596	
13	475.00	6177	50	5983	1	42.500	42.500	1	1	2		40.250	.90		597	
13	437.50	6126	163	6030	3	47.000	-47.000	1	1	0	6126	49.875	.50		598	
13	300.00	6119	134	6052	3	24.250	-24.250	1	1	1	6119	23.500	.10		599	
9	225.00	6100	77	6035	3	20.750	-20.750	3	1	1	6100	19.625	.13		600	
20	700.00	6147	197	5954	1	60.375	-60.375	3	1	2		53.000	.90		601	
16	650.00	6141	151	5948	3	33.250	-33.250	6	1	0	6133	35.375	.50		602	1
16		6141	151	5948	3							33.125	.50	.00	602	2
20	1000.00	6140	219	6044	1	143.000	-143.000	2	1	2		99.000	.00		603	
49	900.00	6133	114	5933	4	37.000	36.750	3	1	2		36.375	1.58		604	
49	850.00	6140	85	5947	3	40.125	-40.125	4	1	1	6140	31.500	.60		605	
49	1075.00	6140	132	5947	3	69.750	69.750	6	1	1	6140	64.625	1.25		606	
49	300.00	6147	36	6052	2	51.750	51.750	8	1	1	6137	47.375	.40		607	
49	512.50	6150	232	6060	1	88.625	88.625	5	1	2		77.000	.00		608	
49	862.50	6126	224	5932	3	39.875	39.875	9	1	1	6126	19.250	.00		609	

61	800.00	6120	232	5847	1	75.625	75.625	3	1	0	6119	79.875	2.25		610	
63	237.50	6133	11	6037	1	32.000	-32.000	7	1	2		26.500	.06		611	
63	225.00	6108	203	6018	1	29.125	-29.125	6	1	2		25.500	.51		612	
68	200.00	6134	181	6039	2	22.500	22.500	2	1	1	6134	20.500	.00		615	
68	200.00	6134	181	6039	2	22.500	22.500	2	1	1	6134	20.500	.00		616	
68	200.00	6134	181	6039	2	22.500	22.500	2	1	1	6134	20.500	.00		617	
68	200.00	6134	181	6039	2	22.500	22.500	2	1	1	6134	20.500	.00		618	
68	200.00	6134	181	6039	2	22.500	22.500	2	1	1	6134	20.500	.00		619	
68	200.00	6134	181	6039	2	22.500	22.500	2	1	1	6134	20.500	.00		620	
68	200.00	6148	181	6050	2	21.250	21.250	2	2	1	6148	18.375	.00		621	
68	200.00	6148	181	6050	2	21.250	21.250	2	2	1	6148	18.375	.00		622	
68	200.00	6148	181	6050	2	21.250	21.250	2	2	1	6148	18.375	.00		623	
68	200.00	6148	181	6050	2	21.250	21.250	2	2	1	6148	18.375	.00		624	
68	200.00	6148	181	6050	2	21.250	21.250	2	2	1	6148	18.375	.00		625	
71	300.00	6154	223	6092	1	47.125	-47.125	9	2	2		39.625	.80		626	
68	650.00	6154	178	6044	3	64.750	-64.750	3	2	0	6154	67.000	.55		627	
68	425.00	6109	159	6044	3	52.750	-52.750	3	2	0	6109	54.750	.25		628	
79	500.00	6142	161	6077	1	91.500	-91.500	2	1	2		75.250	.25		629	
83	337.50	6162	28	6067	3	26.125	-26.125	2	1	1	6162	25.250	.15		630	
84	550.00	6133	41	5939	3	35.750	35.750	4	1	1	6071	30.750	.50		631	1
84		6133	41	5939	3							31.000	.50	.00	631	2
84	662.50	6147	203	5952	3	31.250	31.250	2	1	1	6147	23.000	.46		632	
84	437.50	6134	104	5941	3	30.000	-30.000	1	1	1	6134	25.375	.38		633	
84	612.50	6134	85	5941	3	32.000	32.000	4	1	1	6134	29.500	.60		634	
84	1100.00	6137	116	5944	3	68.875	-68.875	7	1	0	6137	72.500	.60		635	
84	650.00	6137	59	5944	3	37.750	-37.750	6	1	1	6137	36.250	.70		636	
84	475.00	6140	120	5945	3	28.375	-28.250	7	1	1	6140	18.125	.40		637	
84	475.00	6147	189	5952	3	24.000	-24.000	2	1	1	6147	22.000	.50		638	
84	700.00	6147	197	5954	1	60.250	-60.250	3	1	2		53.000	.90		639	
84	512.50	6154	120	5959	3	28.000	-28.000	4	1	1	6154	19.000	.40		640	
84	2225.00	6126	237	5932	2	81.000	81.000	2	1	2		80.625	.75		641	
84	462.50	6126	100	6030	3	41.875	-41.875	3	1	1	6126	28.875	.00		642	
86	250.00	6133	189	5940	1	24.250	24.250	2	1	2		24.250	.50		645	
86	650.00	6140	108	5945	1	59.875	-59.875	3	1	0	6135	72.625	1.10		646	
86	550.00	6137	209	5944	3	35.500	35.500	6	1	0	6137	40.750	.70		647	

86	600.00	6133	99	5939	1	65.000	65.000	3	1	0	6133	75.500	1.00		648	
89	437.50	6126	163	6030	3	47.000	-47.000	1	1	0	6126	49.750	.50		649	
24	275.00	6168	201	6073	3	27.500	-27.500	1	1	2		27.625	.30		650	
24	325.00	6158	27	6093	3	30.500	-30.500	1	1	0	6158	31.125	.15		651	
35	275.00	6149	149	6059	1	37.125	-37.125	2	1	2		27.500	.25		652	
6	500.00	6151	100	6056	3	42.875	42.875	3	1	1	6109	30.625	.00		653	1
6		6151	100	6056	3							26.875	.00	.00	653	2
6	500.00	6151	100	6056	3	42.875	42.875	3	1	1	6149	26.125	.00		654	1
6		6151	100	6056	3							26.875	.00	.00	654	2
40	525.00	6151	12	6056	3	45.750	-45.750	3	1	1	6151	38.250	.23		655	
40	525.00	6151	12	6056	3	45.750	45.750	3	1	1	6151	38.250	.23		656	
72	462.50	6150	232	6060	1	87.875	-87.875	2	1	2		77.000	.00		657	
35	500.00	6151	100	6056	3	42.625	-42.625	2	1	1	6151	27.500	.00		658	
40	500.00	6151	100	6056	3	42.625	-42.625	3	1	1	6151	27.500	.00		659	
9	956.25	6168	8	5973	1	88.875	-88.875	9	1	0	6147	96.500	1.40		660	
9	575.00	6151	77	5958	3	22.750	-22.750	9	1	1	6151	20.125	.23		661	
9	300.00	6151	51	6056	3	28.000	28.000	2	1	1	6108	24.875	.00		662	1
9		6151	51	6056	3							24.875	.25	.00	662	2
9	425.00	6119	172	6056	1	44.500	-44.500	2	1	0	6119	43.750	.45		663	
9	450.00	6126	206	5930	1	45.875	-45.875	7	1	2		43.375	1.10		664	
9	350.00	6147	164	6086	3	37.000	-36.750	6	1	0	6147	41.125	1.62		665	
9	550.00	6144	96	5951	3	34.750	-34.750	7	1	1	6144	28.750	.60		666	
9	500.00	6137	96	5944	3	31.875	-31.875	6	1	1	6137	30.375	.60		667	
9	550.00	6140	96	5945	3	33.000	-33.000	7	1	1	6140	29.750	.60		668	
9	425.00	6119	92	5924	1	40.875	-40.875	5	1	0	6119	46.000	.53		669	
9	650.00	6137	59	5944	3	37.875	-37.875	6	1	1	6137	34.500	.70		670	
9	325.00	6119	51	5930	1	28.750	-28.250	2	1	2		23.500	.50		671	
63	312.50	6168	12	6107	1	42.875	-42.875	3	1	2		38.125	.23		672	
51	425.00	6168	235	6077	1	52.000	52.000	6	7	2		48.000	.10		673	
33	225.00	6151	203	6070	1	29.625	29.625	3	1	2		24.750	.00		674	
57	350.00	6176	11	6081	3	27.250	-27.250	2	1	1	6176	26.625	.06		675	
35	450.00	6157	39	6067	1	54.250	-54.250	6	1	0	6157	54.500	.23		676	
57	525.00	6158	153	6093	3	55.750	-55.750	1	8	1	6122	48.625	.40		677	1
57		6158	153	6093	3							51.750	.40	.00	677	2
49	612.50	6170	182	5976	1	65.000	65.000	3	1	2		55.750	.50		678	

9	500.00	6113	89	6018	3	43.750	-43.750	3	1	0	6113	55.000	.00	679
18	200.00	6028	104	5931	1	28.125	-28.125	6	1	2		26.375	.19	680
18	300.00	6028	85	5931	1	35.375	35.375	2	1	2		34.875	.30	681
46	525.00	6060	223	5869	1	41.375	41.375	2	1	2		39.750	.00	682
46	525.00	6067	223	5876	1	42.625	42.625	5	4	2		41.875	.00	683
46	600.00	6070	205	5877	3	27.625	-27.625	4	4	0	6070	48.250	.00	684
46	350.00	6077	205	5884	1	27.625	27.625	3	4	0	6077	47.125	.00	685
46	400.00	6077	184	5884	1	37.500	37.500	6	4	0	6077	43.000	1.12	686
45	200.00	6063	88	6002	2	22.750	22.750	2	1	1	6063	20.375	.00	687
45	300.00	5986	28	5793	3	14.625	-14.625	3	1	0	5986	18.750	.27	688
45	300.00	5986	28	5793	3	14.625	-14.625	3	1	0	5986	18.750	.27	689
45	400.00	6001	97	5906	2	52.750	52.750	2	1	2		51.500	.50	690
45	350.00	6011	221	5819	3	20.875	20.875	1	1	0	6011	25.500	.94	691
45	350.00	6011	221	5819	3	20.875	20.875	1	1	0	6011	25.500	.94	692
45	162.50	6011	28	5819	2	13.875	13.875	2	1	2		20.375	.27	693
45	162.50	6011	28	5819	2	13.875	13.875	2	1	2		20.375	.27	694
45	425.00	6049	41	5856	3	28.250	28.250	2	1	0	6049	28.250	.50	695
45	475.00	6067	98	5876	1	44.500	44.500	5	1	2		35.875	.25	696
45	250.00	6067	151	5876	1	24.625	24.625	6	1	0	6067	37.375	.50	697
45	237.50	6067	169	5876	1	23.625	23.625	3	1	2		19.500	.60	698
39	750.00	6081	4	5890	1	64.750	64.750	6	1	0	6081	84.750	.00	699
39	362.50	6081	140	5890	1	34.750	34.750	2	1	0	6081	49.500	.30	700
39	362.50	6081	140	5890	1	34.750	34.750	2	1	0	6081	49.500	.30	701
67	250.00	6025	33	5833	3	12.500	12.375	6	2	0	6025	12.875	.25	702
63	300.00	5990	200	5925	1	58.000	58.000	1	1	0	5990	59.750	.25	703
63	550.00	6000	152	5933	1	86.250	-86.250	9	1	2		84.000	.00	704
63	500.00	6016	161	5951	1	89.750	-89.750	1	1	2		85.500	.00	705
74	262.50	5965	10	5868	3	17.125	17.125	2	6	0	5965	21.500	.00	706
74	450.00	6000	74	5909	3	36.500	-36.500	8	6	1	6000	33.125	.00	707
27	362.50	6023	203	5958	3	31.250	31.250	2	2	1	6023	28.000	.00	708
27	362.50	6023	203	5958	3	31.250	31.250	2	2	1	6023	28.000	.00	709
27	250.00	6024	176	5959	3	21.500	21.500	3	2	0	6024	23.125	.00	710
27	312.50	6038	176	5973	3	24.500	24.500	2	2	1	6038	22.375	.00	711
27	312.50	6038	176	5973	3	24.500	24.500	2	2	1	6038	22.375	.00	712
27	275.00	6038	176	5973	3	24.000	23.500	3	2	1	6038	22.375	.00	713

47	475.00	6077	49	5884	1	33.625	33.625	3	2	0	6077	64.875	.30		714
47	475.00	6077	49	5884	1	33.625	33.625	3	2	0	6077	64.875	.30		715
36	350.00	6072	241	5982	3	25.500	25.500	1	1	0	6072	29.625	.30		716
11	350.00	6065	80	5874	3	19.250	-19.250	6	1	0	6065	22.000	.45		717
26	375.00	6063	57	5974	1	41.750	41.500	2	2	0	6063	44.875	.30		718
31	362.50	6063	104	5870	3	27.000	-27.000	1	1	1	6063	25.875	.38		719
87	500.00	6056	187	5864	1	47.625	47.625	5	1	2		47.375	.25		720
80	2050.00	6051	179	5860	1	185.750	185.750	5	1	2		186.000	.10		721
64	225.00	6050	77	5955	1	23.750	-23.750	4	1	2		19.250	.10		722
77	237.50	6042	171	5850	1	18.125	18.125	2	6	2		17.875	.40		723
14	275.00	6018	73	5826	1	23.750	23.750	6	2	2		22.375	.35		724
14	275.00	6018	73	5826	1	23.750	23.750	6	2	2		22.375	.35		725
14	275.00	6018	73	5826	1	23.750	23.750	6	2	2		22.375	.35		726
25	250.00	5993	42	5898	3	24.750	24.750	1	2	0	5993	26.250	.47		727
74	275.00	6066	165	5875	1	20.000	-20.000	2	6	0	6066	29.000	.40		728
28	325.00	6035	212	5842	3	17.750	17.750	3	1	2		17.875	.00		729
56	925.00	6035	39	5842	3	48.125	48.125	2	1	0	6035	56.625	.20		730
56	362.50	6063	104	5871	3	26.875	26.875	1	1	1	6063	25.375	.38		731
56	425.00	6065	120	5874	3	26.000	26.000	6	1	1	6065	23.000	.40		732
74	325.00	6008	207	5913	3	26.125	-26.125	1	1	1	6008	24.375	.00		733
74	337.50	6014	167	5918	1	46.500	-46.500	3	6	2		46.500	.00		734
28	150.00	6025	33	5833	1	12.375	12.375	6	1	0	6025	12.875	.25		735
28	150.00	6025	33	5833	1	12.375	12.375	6	1	0	6025	12.875	.25		736
87	275.00	5934	145	5867	1	43.000	42.625	1	1	0	5924	48.750	.00		737
81	350.00	5930	204	5738	1	35.125	35.125	3	1	0	5930	58.625	3.68		738
37	475.00	5937	186	5902	2	103.500	103.500	2	1	2		129.000	.00		739
8	350.00	5954	191	5762	1	28.625	28.625	3	1	2		16.875	.27		740
37	937.50	5896	39	5875	1	35.125	45.125	2	1	0	5896	53.000	.00		741
37	937.50	5896	39	5875	1	35.125	45.125	2	1	0	5896	53.000	.00		742
37	937.50	5896	39	5875	1	35.125	45.125	2	1	0	5896	53.000	.00		743
37	937.50	5896	39	5875	1	35.125	45.125	2	1	0	5896	53.000	.00		744
37	937.50	5896	39	5875	1	35.125	45.125	2	1	0	5896	53.000	.00		745
37	937.50	5896	39	5875	1	35.125	45.125	2	1	0	5896	53.000	.00		746
37	937.50	5896	39	5875	1	35.125	45.125	2	1	0	5896	53.000	.00		747
37	937.50	5896	39	5875	1	35.125	45.125	2	1	0	5896	53.000	.00		748

5	425.00	5941	52	5876	3	43.125	-43.125	1	1	0	5941	48.375	.50		749		
5	350.00	5940	69	5875	3	35.000	-35.000	3	1	0	5940	48.375	.30		750		
54	525.00	6221	248	6156	3	64.500	64.500	0	0	0	6221	66.000	.00		9001		
9	200.00	6211	243	6150	2	38.875	38.875	0	0	1	6211	37.500	.00		769		
9	250.00	6228	111	6163	3	24.000	24.125	0	0	0	6228	22.625	.00		773		
9	275.00	6232	244	6142	1	43.000	43.000	0	0	0	6232	45.000	.00		777		
9	275.00	6232	244	6142	1	43.000	43.000	0	0	0	6232	45.000	.00		778		
9	250.00	6231	243	6141	1	37.000	37.000	0	0	2		37.750	.00		779		
9	500.00	6221	169	5997	3	20.750	20.750	0	0	0	6221	22.250	.00		781		
9	525.00	6221	159	6126	3	54.375	54.375	0	0	1	6221	49.250	.00		783		
9	425.00	6221	202	6126	3	39.500	39.500	0	0	0	6221	40.250	.00		784		
9	181.25	6219	76	6129	1	24.250	24.250	0	0	0	6219	26.625	.00		785		
9	262.50	6211	169	6015	1	20.250	20.250	0	0	0	6207	23.000	.00		786		
9	262.50	6211	169	6017	1	20.000	20.000	0	0	0	6205	23.375	.00		787		
9	300.00	6189	149	6092	1	28.250	28.250	0	0	2		27.750	.00		791		
9	512.50	6207	163	6014	1	46.250	46.000	0	0	0	6204	63.500	.00		794		
9	512.50	6207	163	6014	1	46.250	46.000	0	0	0	6204	63.500	.00		795		
9	1200.00	6207	245	6099	3	110.000	110.000	0	0	0	6207	138.500	.00		796		
9	150.00	6200	246	6170	2	32.625	32.625	0	0	1	6197	26.625	.00		820		
9	150.00	6200	246	6170	2	32.625	32.625	0	0	1	6197	26.625	.00		821		
9	150.00	6200	246	6170	2	32.625	32.625	0	0	1	6193	26.875	.00		822		
3	212.50	6207	11	6112	2	26.500	26.500	0	0	2		27.750	.00		860		
10	212.50	6207	11	6112	2	26.500	26.500	0	0	2		27.750	.00		861		
10	325.00	6206	216	6116	1	50.875	50.875	0	0	0	6196	50.875	.00		862		
24	200.00	6205	203	6115	1	24.500	24.250	0	0	2		23.875	.00		863		
54	1500.00	6204	3	6008	3	93.250	93.250	0	0	1	6204	90.000	.00		864		
16	1000.00	6204	219	6109	1	108.500	108.500	0	0	0	6204	122.000	.00		865		
54	525.00	6204	75	6008	3	32.000	32.000	0	0	0	6200	40.750	.00		866	1	
54		6204	75	6008	3							42.000	.70	.00	866	2	
30	612.50	6204	12	6011	1	48.000	48.000	0	0	2		39.000	.00		867		
13	500.00	6204	207	6008	3	24.500	24.500	0	0	1	6204	19.500	.00		868		
10	962.50	6204	188	6010	2	121.750	121.750	0	0	2		159.000	.00		869		
3	550.00	6204	108	6008	1	64.250	62.750	0	0	0	6204	72.125	.00		870		
50	600.00	6200	135	6007	1	50.000	50.000	0	0	2		41.250	.00		871		
13	312.50	6200	28	6007	6	22.125	21.000	0	0	0	6196	24.625	.00		872	1	

13		6200	28	6007	6						24.250	.30	2.00	872	2
13	312.50	6200	28	6007	6	22.125	21.000	0	0	0	6200	24.000	.00		873	1
13		6200	28	6007	6						.000	.30	2.00	873	2
13	475.00	6200	56	6007	1	43.500	43.500	0	0	0	6200	47.875	.00		874	
57	950.00	6200	94	6105	3	100.000	100.000	0	0	0	6196	112.750	.00		875	1
57		6200	94	6105	3							112.250	.75	.00	875	2
54	625.00	6197	55	6004	3	28.375	28.250	0	0	1	6197	27.375	.00		876	
32	425.00	6197	202	6102	3	38.750	38.750	0	0	0	6197	41.000	.00		877	
32	425.00	6197	202	6102	3	38.750	38.750	0	0	0	6197	41.000	.00		877	
13	375.00	6196	43	6001	3	18.875	18.875	0	0	1	6196	18.250	.00		878	
49	600.00	6196	182	6002	1	61.750	61.750	0	0	2		54.875	.00		880	
49	600.00	6196	182	6002	1	61.750	61.750	0	0	2		54.875	.00		881	
32	500.00	6196	174	6100	3	53.375	53.375	0	0	0	6193	56.375	.00		882	1
32		6196	174	6100	3							56.500	.35	.00	882	2
16	1100.00	6196	219	6100	1	130.000	130.000	0	0	2		119.250	.00		883	
13	375.00	6193	43	6000	3	19.125	19.125	0	0	1	6193	18.250	.00		884	
32	212.50	6192	21	6102	2	53.625	53.625	0	0	1	6192	48.875	.00		885	
13	331.25	6192	66	5997	3	14.625	14.625	0	0	1	6192	11.125	.00		886	
13	331.25	6192	66	5997	3	14.625	14.625	0	0	1	6192	11.125	.00		887	
13	500.00	6190	20	5997	3	22.625	22.625	0	0	1	6190	21.375	.00		888	
32	200.00	6190	241	6095	1	26.625	26.625	0	0	2		26.125	.00		890	
32	200.00	6190	85	6095	2	28.750	28.750	0	0	2		33.250	.00		891	
82	500.00	6190	223	5997	1	44.875	44.875	0	0	2		40.000	.00		892	
32	962.50	6189	81	5996	1	106.000	106.000	0	0	0	6189	111.250	.00		893	
82	537.50	6189	30	5995	1	39.500	39.500	0	0	2		31.125	.00		894	
13	400.00	6179	149	6084	3	34.375	34.375	0	0	1	6179	29.250	.00		896	
23	350.00	6182	199	5988	1	25.250	25.250	0	0	2		25.250	.00		897	
13	300.00	6182	189	6086	3	25.000	25.000	0	0	1	6182	25.000	.00		898	
33	325.00	6179	57	6084	1	47.875	47.875	0	0	0	6179	58.500	.00		899	
50	400.00	6182	32	6086	1	58.250	58.250	0	0	2		53.375	.00		900	
1	400.00	6182	149	6086	3	34.000	34.000	0	0	0	6175	28.375	.00		901	1
1		6182	149	6086	3							28.750	.25	.00	901	2
57	400.00	6179	149	6084	3	34.375	34.375	0	0	1	6179	29.250	.00		902	
57	400.00	6179	85	6084	3	30.750	30.750	0	0	0	6179	36.000	.00		903	
57	425.00	6189	204	6093	3	41.875	41.875	0	0	1	6189	38.250	.00		911	

24	350.00	6189	241	6093	3	27.875	27.875	0	0	1	6189	25.750	.00		912		
13	562.50	6189	130	5996	1	58.625	58.625	0	0	0	6189	59.750	.00		913		
13	300.00	6189	66	5995	3	15.000	15.000	0	0	1	6189	9.250	.00		914		
13	300.00	6189	66	5995	3	15.000	15.000	0	0	1	6189	9.250	.00		915		
13	637.50	6184	100	5990	6	49.750	48.875	0	0	1	6182	28.875	.00		916	1	
13		6184	100	5990	6							28.750	.15	4.00	916	2	
99	500.00	6184	9	5980	3	26.250	26.250	0	0	1	6184	20.125	.00		917		
86	650.00	6183	12	5989	1	53.375	53.375	0	0	2		37.750	.00		918		
16	550.00	6183	130	5989	1	58.875	58.875	0	0	2		59.000	.00		919		
33	300.00	6183	95	6093	1	38.500	38.500	0	0	2		37.500	.00		920		
4	600.00	6182	47	5988	3	35.000	35.000	0	0	0	6182	34.500	.00		921		
10	500.00	6211	143	6115	3	44.750	44.750	0	0	1	6211	44.500	.00		922		
84	950.00	6239	168	6045	3	78.500	78.500	0	0	1	6239	70.750	.00		924		
84	700.00	6238	85	6042	3	35.000	34.625	0	0	1	6235	30.500	.00		925	1	
84		6238	85	6042	3							30.750	.60	.00	925	2	
54	700.00	6238	85	6042	3	35.000	35.000	0	0	1	6235	30.500	.00		926	1	
54		6238	85	6042	3							30.750	.60	.00	926	2	
13	700.00	6238	85	6042	3	35.625	35.625	0	0	1	6238	30.500	.00		927		
21	1000.00	6238	18	5952	1	128.000	128.000	0	0	0	6238	127.750	.00		928		
10	500.00	6238	21	6044	1	53.250	53.250	0	0	2		50.000	.00		930		
4	550.00	6238	41	6044	3	30.625	30.625	0	0	0	6238	44.750	.00		931		
49	425.00	6238	85	6042	1	34.500	34.500	0	0	2		30.500	.00		932		
3	700.00	6238	85	6042	3	35.250	35.250	0	0	1	6235	30.500	.00		933	1	
3		6238	85	6042	3							30.750	.60	.00	933	2	
16	225.00	6238	247	6141	3	17.000	17.000	0	0	0	6238	19.375	.00		934		
54	600.00	6238	248	6141	3	62.500	62.500	0	0	0	6224	68.000	.00		935	1	
54		6238	248	6141	3							71.500	1.20	.00	935	2	
10	362.50	6238	220	6142	3	35.000	35.000	0	0	0	6238	37.875	.00		936		
3	525.00	6235	163	6140	3	46.625	46.500	0	0	0	6221	65.250	.00		937	1	
3		6235	163	6140	3							70.625	1.00	.00	937	2	
13	500.00	6234	41	6030	3	29.750	29.750	0	0	0	6234	44.875	.00		938		
13	500.00	6234	41	6030	3	29.750	29.750	0	0	0	6234	44.875	.00		939		
84	950.00	6231	168	6037	3	79.625	79.625	0	0	1	6228	69.625	.00		940	1	
84		6231	168	6037	3							68.500	.75	.00	940	2	
84	975.00	6231	38	6037	3	85.750	85.750	0	0	0	6192	97.000	.00		941	1	

84		6231	38	6037	3						93.375	.70	.00	941	2
10	675.00	6231	21	6037	3	56.000	55.500	0	0	1 6211	49.500	.00		943	1
10		6231	21	6037	3						51.250	1.50	.00	943	2
10	537.50	6231	210	6037	3	43.625	43.625	0	0	0 6231	45.875	.00		944	
13	400.00	6227	120	6024	3	23.750	23.750	0	0	1 6227	18.125	.00		945	
10	400.00	6227	120	6024	3	23.750	23.750	0	0	1 6227	18.125	.00		946	
83	475.00	6227	108	6140	1	73.750	73.250	0	0	2	65.375	.00		947	
10	462.50	6226	21	6032	1	57.250	57.250	0	0	2	51.000	.00		948	
84	1100.00	6225	116	6022	3	60.875	60.875	0	0	0 6224	70.250	.00		949	1
84		6225	116	6022	3						67.875	.60	.00	949	2
16	650.00	6225	219	6130	2	108.500	108.500	0	0	2	112.000	.00		950	
16	650.00	6225	219	6130	2	108.500	108.500	0	0	2	112.000	.00		951	
86	400.00	6228	209	6133	3	39.625	39.625	0	0	1 6228	34.875	.00		952	
84	825.00	6224	100	6030	3	41.875	41.875	0	0	1 6224	25.625	.00		953	
10	562.50	6224	153	6128	3	51.250	51.250	0	0	1 6224	49.000	.00		954	
55	375.00	6224	98	6128	3	26.500	27.125	0	0	0 6224	32.500	.00		955	
84	475.00	6221	120	5997	3	26.250	26.250	0	0	1 6221	18.500	.00		957	
62	1075.00	6221	63	5997	3	55.625	55.625	0	0	1 6221	53.875	.00		958	
54	1600.00	6221	65	6007	3	82.500	82.500	0	0	0 6219	120.250	.00		959	1
54		6221	65	6007	3						121.000	1.00	.00	959	2
82	475.00	6221	120	5997	3	26.000	26.000	0	0	1 6221	18.625	.00		960	
82	550.00	6221	137	5997	3	24.875	24.875	0	0	1 6221	20.250	.00		961	
51	275.00	6221	134	6126	3	25.125	25.125	0	0	2	24.375	.00		962	
51	275.00	6221	134	6126	3	25.125	25.125	0	0	2	24.375	.00		963	
32	425.00	6221	202	6126	3	39.500	39.500	0	0	2	40.250	.00		964	
30	237.50	6221	120	6126	3	21.000	21.000	0	0	1 6221	18.500	.00		965	
54	525.00	6221	159	6126	3	54.375	54.375	0	0	1 6221	49.750	.00		966	
49	537.50	6217	132	6023	1	64.875	64.875	0	0	0 6217	70.625	.00		968	
57	400.00	6217	21	6093	1	55.000	55.375	0	0	2	51.000	.00		969	
49	537.50	6217	132	6023	1	64.875	64.875	0	0	0 6217	70.625	.00		970	
55	600.00	6217	141	6122	3	64.375	64.375	0	0	1 6217	61.500	.00		971	
4	275.00	6214	28	6021	1	20.875	20.750	0	0	0 6213	23.375	.00		972	
5	275.00	6213	249	6148	1	49.000	49.000	0	0	0 6197	51.750	.00		973	
83	605.00	6212	12	6016	1	49.250	49.250	0	0	2	41.500	.00		975	
54	337.50	6212	203	6016	1	28.625	28.625	0	0	2	23.500	.00		976	

32	337.50	6212	11	6016	1	29.000	29.000	0	0	2		29.125	.00	977
83	500.00	6211	204	6016	1	46.250	46.250	0	0	2		37.000	.00	979
83	325.00	6211	105	6016	3	14.375	14.375	0	0	0	6211	15.500	.00	980
16	387.50	6211	28	6016	3	20.875	20.875	0	0	0	6211	24.375	.00	981
10	350.00	6211	127	6018	1	30.875	30.875	0	0	0	6207	37.250	.00	982
10	675.00	6211	108	6015	1	62.500	62.500	0	0	0	6211	71.875	.00	983
55	225.00	6235	14	6170	1	36.875	36.870	0	0	2		36.250	.00	984
10	437.50	6234	71	6169	3	42.250	42.125	0	0	0	6234	54.250	.00	987
24	362.50	6226	204	6161	3	38.875	38.875	0	0	1	6226	33.125	.00	991
54	525.00	6221	248	6156	3	64.500	64.500	0	0	0	6221	66.000	.00	1034

APPENDIX 2

SAMPLE ØF DATA PRØVIDED BY DENMAR ØN PUNCHED CARDS *

```
300 000911PUBØ    38875010220200004050 38875 21102103750001022 3
300 001312CGNI    24000011920250004070 24125 21115102262501192 2
300 001322PGNI    24000011920000004070 24125 211151022625      -
300 001711CACY    43000012320275004075 43000 31025104500001232 2
300 001811CACY    43000012320275004075 43000 31025104500001232 2
300 001911CUBØ    37000012220250004010 37000 310241037750     -1
300 002112CØM     20750011220500004075 20750 7060210222500l122 2
300 002122PØM     20750011220000004075 20750 706021022250      -
300 002312CMTC    54375011220525004044 54375 310091049250      -
300 002322PMTC    54375011220525004044 54375 31009104975001122 3
300 002412CSCH    39500011220425004044 39500 31009104025001122 2
300 002422PSCH    39500011220000004044 39500 310091040250      -
300 002511CDI     24250011020181254075 24250 31012102662501102 2
300 002611CØM     20250010220262504050 20250 60620102300012291 2
300 002711CØM     20000010220262504050 20000 60622102337512271 2
300 003111CML     28250121110300004070 28250 309051027750     -1
300 003411CNV     46250122910512504075 46000 60619106355012261 2
300 003511CNV     46250122910512504075 46000 60619106350012261 2
300 003612CFFI   11000012291120000404411000O 30912113850012291 2
300 003622PFFI   11000012291000000404411000O 309121138500      -
300 006011PISS    32625122210150004090 32625 11122102662512191 3
300 006111PISS    32625122210150004090 32625 11122102662512191 3
```

* SEE FØLLØWING PAGE FØR A DESCRIPTIØN ØF DATA FØRMAT

Data Format for Put and Call Option Data

Supplied on Punched Cards by Denmar Corporation

Item	Punched Card Column Numbers
Writer	1-3
Active Account? (Negative punch if inactive)	4
Transaction number	5-8
Card number	9-10
Option type	11
Stock symbol	12-16
Striking price	17-22
Expiration date	23-27
Premium	28-33
Broker	34-35
Dealer	36-37
Market price on trade date	38-43
Source of stock+	44
Duration	45
Trade date	46-50
Market price when action taken	51-56
Date action taken	57-61
Expired? (Negative punch if yes)	62
Premium disposition	63

+Indicates whether had position in stock or whether went long to hedge (information was not provided on all data cards).

SPS SØURCE PRØGRAM TØ CØNVERT STØCK AND ØPTIØN SYMBØLS TØ A NUMERICAL CØDE.

```
        DØRG00402
START   SF   TABLE-1,,2
        SF   TABLE+7
        TNF  TABLE+6,CØN2
        AM   CØN2,1,9
        CM   CØN2,999
        BE   BEGIN1
        AM   START+6,14
        AM   START+18,14
        AM   START+30,14
        B    START
BEGIN1RACDCARD
        TD   ØNE,CARD+83
        CM   ØNE,7
        BNE  BEGIN2
        TFM  B+18,TABLE+12
        TFM  C-1,TABLE+8
        TFM  C+18,TABLE+12
        SF   CARD+19
        SF   CARD+21
        CM   CARD+20,43
        BE   SET1
        CM   CARD+20,57
        BE   SET2
SET1    TDM  CARD+134,1
        TDM  CARD+133,7
        B    C-12
SET2    TDM  CARD+134,2
        TDM  CARD+133,7
        B    C-12
B       SF   *+14
        C    TABLE+12,CARD+26
```

```
        BE   C
        AM   C-1,14
        AM   B+18,14
        AM   C+18,14
        BD   B,TABLE+8
C       TF   CØN1,B+18
        TF   TABLE+12,CARD+26
        SM   CØN1,6
        TF   CARD+26,CØN1,11
        CF   CARD+21
        WACDCARD
        BLC  PUNCH
        B    BEGIN1
PUNCH   TF   PNCH+12,TABLE+12
        TF   PNCH+4,TABLE+6
        WACDPNCH
        AM   PUNCH+11,14
        AM   PUNCH+23,14
        AM   *+23,14
        BD   PUNCH,TABLE+8
        RCTY
        WATYEND
        H
        B    BEGIN1
BEGIN2RACDCARD
        TD   TWØ,CARD+83
        CM   TWØ,7
        BE   BEGIN1
        TFM  D+18,TABLE+12
        TFM  E-1,TABLE+8
        TFM  E+18,TABLE+12
        SF   CARD+83
        SF   CARD+93
        CM   CARD+84,43
        BE   SET3
```

```
        CM   CARD+84,57
        BE   SET4
        CM   CARD+84,62
        BE   SET5
SET3    TDM  CARD+84,1
        TDM  CARD+83,7
        B    E-12
SET4    TDM  CARD+84,2
        TDM  CARD+83,7
        B    E-12
SET5    TDM  CARD+84,3
        TDM  CARD+83,7
        B    E-12
D       SF   *+14
        C    TABLE+12,CARD+98
        BE   E
        AM   D+18,14
        AM   E-1,14
        AM   E+18,14
        BD   D+12,TABLE+8
E       TF   CØN1,D+18
        TF   TABLE+12,CARD+98
        SM   CØN1,6
        TF   CARD+98,CØN1,11
        CF   CARD+93
        WACDCARD
        BLC  PUNCH
        B    BEGIN2
CØN1    DC   5,0
CØN2    DC   3,1
ØNE     DC   5,0
TWØ     DC   5,0
END     DAC  8,END
CARD    DAS  80
PNCH    DAS  80
```

TABLE DAS 8400
DENDSTART

ØUTPUT ØBTAINED FRØM TRANSFØRMING AN ALPHANUMERIC CØDE TØ A NUMERIC CØDE

```
300 000911 001   38875010220200004050 38875 211021037500001022 3    2
300 001312 002   24000011920250004070 24125 211151022625001192 2    1
300 001322 002   24000011920000004070 24125 211151022625     -    2
300 001711 003   43000012320275004075 43000 310251045000001232 2    1
300 001811 003   43000012320275004075 43000 310251045000001232 2    1
300 001911 001   37000012220250004010 37000 310241037750     -1    1
300 002112 004   20750011220500004075 20750 706021022250001122 2    1
300 002122 004   20750011220000004075 20750 706021022250     -    2
300 002312 005   54375011220525004044 54375 310091049250     -    1
300 002322 005   54375011220525004044 54375 310091049750001122 3    2
300 002412 006   39500011220425004044 39500 310091040250001122 2    1
300 002422 006   39500011220000004044 39500 310091040250     -    2
300 002511 007   24250011020181254075 24250 310121026625001102 2    1
300 002611 004   20250010220262504050 20250 606201023000012291 2    1
300 002711 004   20000010220262504050 20000 606221023375122 71 2    1
300 003111 008   28250121110300004070 28250 309051027750     -1    1
300 003411 009   46250122910512504075 46000 606191063550012261 2    1
300 003511 009   46250122910512504075 46000 606191063500012261 2    1
300 003612 010  11000012291120000404411 0000 309121138500012291 2    1
300 003622 010  11000012291000000404411 0000 309121138500     -    2
001 UBØ
002 GNI
003 ACY
004 ØM
005 MTC
006 SCH
007 DI
008 ML
009 NV
010 FFI
```

```
C  THIS PRØGRAM CØNVERTS DENMAR,S FØRMAT (WITH STØCK SYMBØLS AND PUT AND CALL
C     CALL SYMBØLS CØNVERTED TØ NUMBERS) TØ THE WRITER,S FØRMAT.
C     INPUT CARDS MUST HAVE CARDS 1 AND 2 IN SEQUENCE.
C     ØUTPUT CARDS WILL NØT HAVE 2 CARD CØNTRACTS SØ NUMBERED.
C     STØCK IDENTIFICATIØN NUMBERS WILL HAVE TØ BE CHANGED  UNLESS THEY ØRIGIN-
C     ALLY WERE CØNVERTED TO  A NUMBERING SYSTEM CØRRESPØNDING WITH  THE
C     CØDE TØ BE USED.
C     DIVIDENDS AND LAST DAY,S PRICE +DIV. THRØUGH LAST DAY  IF ACTIØN TAKEN
C     EARLY ØN PART ØF CØNTRACT MUST BE ENTERED BY HAND.
C     IF STATEMEMTS FØR BRØKERS AND ENDØRSER NUMBER TRANSFERS
C     GANG PUNCH A 9. IN CØLUMNS 2 CØLUMS BEYØND - SIGN.
C     NC=CLIENT NØ.
C     NF=SIGNED TRANSACTIØN NØ.
C     N12=CARD X ØUT ØF Y CARDS.
C     NK=TYPE ØPTIØN.
C     NN=STØCK IDENTIFICATIØN NØ.
C     N7=NØTHING
C     NØ=ØPTIØN PRICE(STRIKING PRICE).
C     I,J,NG=EXPIRATIØN DATE.
C     NP=PREMIUM.
C     NBD=BRØKER AND DEALER.
C     NM=MARKET PRICE AT TRADE DATE.
C     NLV=WENT ØR WAS LØNG AND DURATIØN.
C     K,L,NT=TRADE DATE.
C     NX=MARKET PRICE AT EXPIRATIØN.
C     MA,N,NZ=DATE EXERCISED ØPTIØN.
C     NR=EXERCISED AND PREMIUM DISPØSITIØN.
C     NW=TYPE ØPTIØN.
C     N4=ØPTIØN PRICE.
C     NGA=NØTHING.
C     N5=NØTHING.
C     NTA=NØTHING.
C     LK=MARKET PRICE AT EXPIRATIØN.
C     J1,J2,J3,=DATE EXERCISED.
C     HANDLE STRIPS AND STRAPS BY HAND CALCULATIØN
```

```
      DIMENSIØN M(30)
      M(1)=5844
      M(2)=5875
      M(3)=5903
      M(4)=5934
      M(5)=5964
      M(6)=5995
      M(7)=6025
      M(8)=6056
      M(9)=6087
      M(10)=6117
      M(11)=6148
      M(12)=6178
      M(13)=6209
      M(14)=6240
      M(15)=6268
      M(16)=6299
      M(17)=6329
      M(18)=6360
      M(19)=6390
      M(20)=6421
      M(21)=6452
      M(22)=6482
      M(23)=6513
      M(24)=6543
      M(25)=6574
    1 NTEST=0
      READ 1345,NC,NF,N12,NN,ØN,IJ,NG,PN,NBD,AM,NLV,KL ,NT,XN,MAN,NZ,RN,NK
      IF(NF)9531,9532,9532
 9531 NF=-NF
 9532 IF(N12-12)3,2,4
    2 READ 1987,NC,NE,N12,NN,A4,NGA,APN,NBD,AM,NLV2,NTA,AL,J1,J2,J3,RN2,NW
      GØ TØ 3
    4 PRINT 1456,NF
      PAUSE
```

```
      GØ TØ 1
    3 DELPC=0.
      NDA2=0
      PAT2=0
      ØPR=ØN/1000.
      PR=PN/100.
      PRM=AM/1000.
      IF(XN)1234,1500,1501
1501  PAT=XN/1000.
      GØ TØ 1502
1500  PAT=AL/1000.
1502  IF(N12-11)1234,5,6
    5 NTY=NK
      IF(RN)7,1234,8
    7 NA=2
      GØ TØ 10
    8 IF(NTY-1)1234,9,11
    9 NA=0
      GØ TØ 10
   11 IF(NTY-2)1234,12,1234
   12 NA=1
      GØ TØ 10
    6 IF(N12-22)1234,20,1234
   20 NNØW=NK+NW
      IF(NNØW-3)1234,21,1234
   21 NTY=3
      IF(RN)22,1234,24
   22 IF(RN2)25,1234,26
   25 NA=2
      GØ TØ 70
   26 IF(NW-1)1234,27,28
   27 NA=0
      GØ TØ 70
   28 IF(NW-2)1234,29,1234
   29 NA=1
```

```
   GØ TØ 70
24 IF(RN2)30,1234,31
30 IF(NK-1)1234,27,33
33 IF(NK-2)1234,29,1234
31 NA=3
   NTEST=1
   IF(NK-1)1234,40,41
40 PAT2=AL/1000.
   GØ TØ 70
41 IF(NK-2)1234,42,1234
42 PAT2=PAT
   PAT=AL/1000.
70 IF(ØN-A4)71,10,71
71 NTY=6
   IF(NK-1)1234,72,74
74 ØPR=A4
   ØPR=ØPR/1000.
   DELPC=ØPR-ØN/1000.
   GØ TØ 10
72 DELPC=ØN-A4
   DELPC=DELPC/1000.
10 XIJ=IJ
   XIJ=XIJ/100.
   IJ=XIJ
   YXIJ=IJ
   ZXIJ=XIJ-YXIJ
   KIJ=ZXIJ*100.
   I=IJ
   J=KIJ
   ABC=KL
   ABC=ABC/100.
   KL=ABC
   DABC=KL
   CABC=ABC-DABC
   IKL=CABC*100.
```

```
    K=KL
    L=IKL
    EFG=MAN
    EFG=EFG/100.
    MAN=EFG
    DEFG=MAN
    CDEF=EFG-DEFG
    MNA=CDEF*100.
    MA=MAN
    N=MNA
    IF(NG-1)1234,50,51
 50 NTR=M(I)+J
    GØ TØ 54
 51 IF(NG-2)1234,53,1234
 53 NTR=M(I+12)+J
 54 IF(NT-1)1234,55,56
 55 NTE=M(K)+L
    GØ TØ 58
 56 IF(NT-2)1234,57,1234
 57 NTE=M(K+12)+L
 58 IF(RN)310,1234,59
310 IF(NTY-3)311,312,317
317 IF(NTY-6)311,312,311
312 IF(RN2)311,1234,316
311 IF(NA-2)1234,99,1234
316 IF(J3-1)1234,313,314
313 NDA=M(J1)+J2
    GØ TØ 63
314 IF(J3-2)1234,315,1234
315 NDA=M(J1+12)+J2
    GØ TØ 63
 59 IF(NZ-1)1234,60,61
 60 NDA=M(MA)+N
    GØ TØ 63
 61 IF(NZ-2)1234,62,1234
```

```
 62 NDA=M(MA+12)+N
 63 IF(NA-3)99,64,1234
 64 IF(J3-1)1234,65,66
 65 NDA2=M(J1)+J2
    GØ TØ 99
 66 IF(J3-2)1234,67,1234
 67 NDA2=M(J1+12)+J2
 99 IF(NF)80,4556,81
 80 INØ=-NF+500
    GØ TØ 90
 81 INØ=NF+500
 90 IF(NC-30) 300,200,201
200 NC=1
    GØ TØ 300
201 IF(NC-80) 300,202,280
202 NC=3
    GØ TØ 300
280 IF(NC-83) 300,281,203
281 NC=4
    GØ TØ 300
203 IF(NC-87) 300,204,205
204 NC=5
    GØ TØ 300
205 IF(NC-88) 300,206,207
206 NC=6
    GØ TØ 300
207 IF(NC-143) 300,208,209
208 NC=10
    GØ TØ 300
209 IF(NC-144) 300,208,210
210 IF(NC-159) 300,211,212
211 NC=12
    GØ TØ 300
212 IF(NC-161) 300,213,214
213 NC=13
```

```
    GØ TØ 300
214 IF(NC-174) 300,215,216
215 NC=16
    GØ TØ 300
216 IF(NC-181) 300,217,218
217 NC=19
    GØ TØ 300
218 IF(NC-247) 300,219,220
219 NC=20
    GØ TØ 300
220 IF(NC-248) 300,221,222
221 NC=17
    GØ TØ 300
222 IF(NC-285) 300,223,224
223 NC=21
    GØ TØ 300
224 IF(NC-292) 300,225,226
225 NC=23
    GØ TØ 300
226 IF(NC-293) 300,227,228
227 NC=24
    GØ TØ 300
228 IF(NC-300) 300,229,230
229 NC=9
    GØ TØ 300
230 IF(NC-319) 300,231,232
231 NC=33
    GØ TØ 300
232 IF(NC-321) 300,233,234
233 NC=30
    GØ TØ 300
234 IF(NC-328) 300,235,236
235 NC=32
    GØ TØ 300
236 IF(NC-336) 300,237,238
```

```
237 NC=34
    GØ TØ 300
238 IF(NC-338) 300,239,240
239 NC=35
    GØ TØ 300
240 IF(NC-422) 300,241,242
241 NC=41
    GØ TØ 300
242 IF(NC-467) 300,243,244
243 NC=43
    GØ TØ 300
244 IF(NC-519) 300,245,263
245 NC=49
    GØ TØ 300
263 IF(NC-520) 300,262,246
262 NC=50
    GØ TØ 300
246 IF(NC-560) 300,247,248
247 NC=54
    GØ TØ 300
248 IF(NC-561) 300,249,250
249 NC=55
    GØ TØ 300
250 IF(NC-583) 300,251,252
251 NC=57
    GØ TØ 300
252 IF(NC-692) 300,253,254
253 NC=63
    GØ TØ 300
254 IF(NC-713) 300,255,256
255 NC=62
    GØ TØ 300
256 IF(NC-714) 300,257,258
257 NC=64
    GØ TØ 300
```

```
 258 IF(NC-732) 300,259,260
 259 NC=15
     GØ TØ 300
 260 IF(NC-752) 300,261,264
 261 NC=70
     GØ TØ 300
 264 IF(NC-754) 300,265,266
 265 NC=71
     GØ TØ 300
 266 IF(NC-785) 300,267,268
 267 NC=75
     GØ TØ 300
 268 IF(NC-821) 300,269,270
 269 NC=79
     GØ TØ 300
 270 IF(NC-848) 300,271,272
 271 NC=82
     GØ TØ 300
 272 IF (NC-849) 300,273,274
 273 NC=83
     GØ TØ 300
 274 IF(NC-894) 300,275,276
 275 NC=84
     GØ TØ 300
 276 IF(NC-895) 300,275,278
 278 IF(NC-940) 300,279,300
 279 NC=86
 300 NB=0
     NE=0
     NSK=NN
     GØ TØ 301
1234 PUNCH 2456,NF
     PAUSE
     GØ TØ 1
 301 IF(NA-2)303,304,303
```

```
  303 PUNCH 2134,NC,PR,NTR,NSK,NTE,NTY,ØPR,PRM,NB,NE,NA,NDA,PAT,INØ
      IF(DELPC)1234,306,305
  305 NTEST=1
  306 IF(NTEST-1)1,302,1234
  302 IF(NDA2)1234,307,308
  308 PUNCH 2753,NDA2,PAT2,DELPC,INØ
      GØ TØ 1
  307 PUNCH 3753,DELPC,INØ
      GØ TØ 1
  304 PUNCH 2234,NC,PR,NTR,NSK,NTE,NTY,ØPR,PRM,NB,NE,NA,PAT,INØ
      GØ TØ 1
 2134 FØRMAT(I3,F8.2,I5,I4,I5,I2,F8.3,F9.3,I2,I2,I2,I5,F8.3,2X,1H.7X,I5)
 2234 FØRMAT(I3,F8.2,I5,I4,I5,I2,F8.3,F9.3,I2,I2,I2,5X,F8.3,2X,1H.7X,I5)
 2456 FØRMAT(29HSØMETHING IS WRØNG,TRAN. NØ.=I5)
 1456 FØRMAT(45HMØRE THAN 2 CARDS FØR TRANSACTIØN ,TRAN. NØ.=I5)
1345FØRMAT(I3,I5,I2,I4,F8.0,I4,I1,F6.0,I4,F6.0,I2,I4,I1,F6.0,I4,I1,F4.0,I3)
 1987 FØRMAT(I3,I5,I2,I4,F8.0,I5,F6.0,I4,F6.0,I2,I5,F6.0,I2,I2,I1,F4.0,I3)
 2753 FØRMAT(48X,2X,I5,F8.3,2X,1H.2X,F5.2,I5)
 3753 FØRMAT(48X,11X,1H.5X,1H.2X,F5.2,I5)
 4556 STØP
      END
```

APPENDIX 3

```
C      THIS PRØGRAM CHECKS FØR PØSSIBLE ERRØRS IN ØPTIØN DATA.


      DIMENSIØN INØ(500)
  950 DØ 980 I=1,500
  100 READ 1, NC,PR,NTR,NSK,NTE,NTY,ØPR,PRM,NB,NE,NA,NDA,PAT,DIV,INØ(I)
      ISIG=0
  154 ISIG=ISIG+1
  153 GØ TØ (155,150,156,157,159),ISIG
  152 EIG=IEIG
      SEIG=(PRG-EIG)/.125
      IIEIG=SEIG
      EEIG=IIEIG
      IF(SEIG-EEIG)151,154,151
  155 IEIG=PR
      PRG=PR
      GØ TØ 152
  150 IEIG=ØPR
      PRG=ØPR
      GØ TØ 152
  156 IEIG=PRM
      PRG=PRM
      GØ TØ 152
  157 IEIG=PAT
      PRG=PAT
      GØ TØ 152
  151 PUNCH 132,INØ(I)
      GØ TØ 154
  159 IF(100-NC)2,3,3
    2 PUNCH 101, INØ(I)
    3 ØPRR=20.*ØPR
      IF(ØPRR-PR)4,4,5
    4 PUNCH 102,INØ(I)
    5 ØPRD= 5.*ØPR
```

```
    IF(PR-ØPRD)6,6,7
  6 PUNCH 103, INØ(I)
  7 IF(NTR-NTE)8,8,9
  8 PUNCH 104,INØ(I)
  9 IF(NTR-NDA)10,11,11
 10 PUNCH 105,INØ(I)
 11 IF(NA-2)220,13,220
220 IF(NDA-NTE)12,12,13
 12 PUNCH 106,INØ(I)
 13 IF(400-NSK)14,14,15
 14 PUNCH 107,INØ(I)
 15 IF(6-NTY)16,17,17
 16 PUNCH 108,INØ(I)
 17 PATT=.6*PAT
    IF(ØPR-PATT)18,18,19
 18 PUNCH 109,INØ(I)
 19 IF(10.-DIV)20,20,21
 20 PUNCH 110, INØ(I)
 21 DIVV=DIV/ØPR
    IF(.05-DIVV)22,22,23
 22 PUNCH 111,INØ(I)
 23 IF(I-1)323,90,323
323 INØØ=INØ(I)-INØ(I-1)
    IF(INØØ)24,25,26
 24 PUNCH 112, INØ(I)
    GØ TØ 90
 25 PUNCH 113,INØ(I)
    GØ TØ 90
 26 KKK=0
 99 KKK=KKK+1
    INØØØ=INØØ-KKK
    IF(INØØØ)130,90,91
 91 INØZØ=INØ(I)-KKK
    PUNCH 131,INØZØ
    GØ TØ 99
```

```
 90 IF(NTY-1)37,28,27
 28 IF(NA)29,29,30
 29 PRICE=PAT-ØPR
    IF(PRICE)31,32,34
 31 PUNCH 114,INØ(I)
    GØ TØ 34
 32 IF(DIV)33,33,34
 33 PUNCH 115,INØ(I)
    GØ TØ 34
 30 IF(NA-1)37,301,330
301 PUNCH 128,INØ(I)
    GØ TØ 34
330 IF(NA-2)37,38,39
 37 PUNCH 116,INØ(I)
    GØ TØ 34
 38 IF(NDA)41,34,41
 41 PUNCH 117,INØ(I)
    GØ TØ 34
 39 IF(NA-7)37,52,37
 27 IF(NTY-2)37,36,35
 36 IF(NA-1)42,43,330
 42 PUNCH 118, INØ(I)
    GØ TØ 34
 43 RICE=ØPR-PAT
    IF(RICE)45,45,34
 45 PUNCH 119,INØ(I)
    GØ TØ 34
 35 IF(NTY-3)37,46,47
 46 IF(3-NA)51,48,49
 48 PUNCH 120,INØ(I)
    GØ TØ 34
 49 IF(NA-2)34,50,34
 50 PUNCH 122,INØ(I)
    IF(NDA) 41,34,41
 51 IF(NA-7) 37,52,37
```

```
 52 PUNCH 121, INØ(I)
    GØ TØ 34
 47 IF(NTY-4)37,54,53
 54 IF(NA-9)55,37,55
 55 IF(NA-5)56,37,56
 56 IF(NA-6)57,37,57
 57 IF(NA-3)58,37,58
 58 IF(NA-7)59,52,59
 59 IF(NA-2)34,60,34
 60 PUNCH 122,INØ(I)
    GØ TØ 34
 53 IF(NTY-5)37,62,61
 62 IF(NA-4) 63,37,63
 63 IF(NA-8)56,37,56
 61 IF(NTY-6)37,64,37
 64 PUNCH 123,INØ(I)
    IF(NA-0)37,34,214
214 IF(NA-1)37,34,215
215 IF(NA-2)37,60,212
212 IF(NA-7)216,52,37
216 IF(NA-6)37,34,37
 34 IF(NA-2)200,201,200
201 IF(NDA)202,200,202
202 PUNCH 124,INØ(I)
200 IF(PRM)207,208,208
207 PRM=-PRM
208 DEL=PRM-ØPR
    IF(DEL)209,999,210
209 DEL=-DEL
210 IF(DEL-.5)999,206,206
206 PUNCH 125, INØ(I)
999 NTRE=NTR-NTE
    IF(NTRE-196)997,997,211
211 PUNCH 127, INØ(I)
    GØ TØ 980
```

```
997 IF(NTRE-30)996,996,998
996 PUNCH 129, INØ(I)
    GØ TØ 980
998 IF(NTRE-60)990,980,988
990 IF(35-NTRE)987,980,980
987 PUNCH 133,INØ(I)
    GØ TØ 980
988 IF(NTRE-90)986,980,984
986 IF(67-NTRE)987,980,980
984 IF(NTRE-188)979,987,980
979 IF(100-NTRE)987,987,980
980 CØNTINUE
  1 FØRMAT(I3,F8.2,I5,I4,I5,I2,F8.3,F9.3,I2,I2,I2,I5,F8.3,F5.2,5X,I5)
101 FØRMAT(49HCLIENT INCØRRECTLY IDENTIFIED ØN TRANSACTIØN      I4)
102 FØRMAT(49HPREMIUM GREATER THAN .2 ØPTIØN PRICE TRANSACTIØN  I4)
103 FØRMAT(49HPREMIUM LESS THAN .05 ØPTIØN PRICE TRANSACTIØN    I4)
104 FØRMAT(49HTRADE DATE LATER/ØR=EXPIRATIØN DATE TRANSACTIØN   I4)
105 FØRMAT(49HDATE ACT. TAKEN LATER THAN EXPIRA. DATE TRANSAC.  I4)
106 FØRMAT(49HTRADE DATE LATER THAN DATE ACTIØN TAKEN TRANSAC.  I4)
107 FØRMAT(49HSTØCK IDENTIFICATIØN NØ. INCØRRECT ØN TRANSAC.    I4)
108 FØRMAT(49HØPTIØN TYPE INDICATED DØES NØT EXIST ØN TRANSAC.  I4)
109 FØRMAT(49HØPT. GAIN MØRE THAN .667 ØF ØPT. PRICE.TRANSAC.   I4)
110 FØRMAT(49HDIVIDEND GREATER THAN $ 10. ØN TRANSACTIØN        I4)
111 FØRMAT(49HDIV. GREATER THAN/=.05 ØF ØPT. PRICE ØN TRANSAC.  I4)
112 FØRMAT(49HCARD IS ØUT ØF SEQUENCE ØN TRANSACTIØN           I4)
113 FØRMAT(49HCARD IS DUPLICATE ØN TRANSACTIØN                 I4)
114 FØRMAT(49HCALL EXER. WHEN MKT. BELØW ØPT. PRICE TRANSAC.   I4)
115 FØRMAT(49HCALL EXER. WHEN MKT.=ØPT.PRICE BUT NØ DIV. TRAN. I4)
116 FØRMAT(49HACTIØN TAKEN DESCRIBED INCØRRECTLY TRANSACTIØN   I4)
117 FØRMAT(49HEXECU. DATE WRITTEN WHERE ØPT. EXPIRED TRANSAC.  I4)
118 FØRMAT(49HPUT ØPTIØN CALLED ØN TRANSACTIØN                 I4)
119 FØRMAT(49HMARKET GREATER/ØR=ØPT. PRICE WHEN PUT EXER.TRAN. I4)
120 FØRMAT(49HBØTH ENDS ØF TRANSACTIØN EXERCISED ØN TRANSAC.   I4)
121 FØRMAT(49HØPTIØN EXTENDED ØN TRANSACTIØN                   I4)
122 FØRMAT(49HUNUSUAL EXPIRATIØN ØN TRANSACTIØN                I4)
```

```
123 FØRMAT(49HTHIS TRANSACTIØN IS A SPREAD                          I4)
124 FØRMAT(49HEXPIRATIØN.THEREFØRE NØ EXERCISE DATE PØSSIBLE       I4)
125 FØRMAT(49HDIFF. ØPTIØN AND MKT. PRICE GREATER THAN $.5         I4)
127 FØRMAT(49HØPTIØN DURATIØN GREATER THAN 197 DAYS ØN TRANSAC.    I4)
128 FØRMAT(49HCALL ØPTIØN PUT ØN TRANSACTIØN                       I4)
129 FØRMAT(49HØPTIØN DURATIØN LESS THAN/= 30 DAYS ØN TRANSAC.      I4)
131 FØRMAT(49HTHIS TRANSACTIØN HAS BEEN ØMITTED                    I4)
132 FØRMAT(49HPRICE NØT IN EIGHTS ØN TRANSACTIØN                   I4)
133 FØRMAT(49HCHECK ØPTIØN DURATIØN ØN TRANSACTIØN                 I4)
130 STØP
    END
```

APPENDIX 4

PRØGRAM USED TØ CALCULATE ØPTIØN WRITING PRØFITABILITY

```
C      ASSUMES PREMIUM RETAINED USED TØ MARGIN ØPTIØN SALE.
C      RKEPT=PER CENT ØF PREMIUM KEPT BY WRITER/100.
C      IF CALL ØR PUT HEDGED, CØMMISSIØN CHARGED. NØNE CHG. IF P.ØR C. EXPIRES,
C      I.E.,ASSUMED TRANSFERRED TØ INVESTMENT PØRTFØLIØ FØR SELL ØR CØVER DECISN.
C      METH=1 IF C.H. AND P.M. , =2 IF C.M. AND P.M. , =3 IF C.M. AND P.H.
C      METH=4 IS SAME AS (1) EXCEPT P.H. FØR PUT.
C      METH=5 SAME AS (3) EXCEPT C.H. FØR CALL.
C      C AND P ARE RESPECTIVELY THE CALL AND PUT MARGINS AS A PER CENT.
C      LAST DATA CARD MUST BE A DUMMY WITH INØ=9000 ØR 9001. IF 9001 NEW DATA SET
C      USES SAME PARAMATERS. IF=9000 NEW DATA SETS NEED NEW PARAMETER NUMBERS
C      CØMPØUND INTEREST METHØD REFERS TØ METHØD WHERE CØMPØUND INTEREST
C      FØRMULA IS USED FØR ALL RETURNS ØN ØRIGINAL CAPITAL GREATER THAN -1.
C      IF R.ØF R. IS LESS THAN -1.,THAT RATE IS ASSUMED AS THE ANNUAL R.ØF R.
C      MØDIFIED CØMPØUND INTEREST METHØD REFERS TØ CHANGING RATE TØ A + RATE ØF
C      RETURN FØR THE PERIØD IN QUESTIØN IF ØRIGINALLY NEGATIVE AND MULTIPLYING
C      THE ANNUAL RATE BY -1.
C      IF PNCHU=1.,ØUTPUT IS PUT ØN CARDS.IF PINTR=1.,ØUTPUT IS PRINTED.IF=0,NØ.
 1300 READ 2567,RKEPT
      READ 1457,METH
      READ 3567,C,P
      READ 3567,PNCHU,PINTR
      ZZ=RKEPT
      NPUT=P
      NCAL=C
 1200 IF(PNCHU)1234,2101,2100
 2100 PUNCH 7655,METH
      PUNCH 7656,NPUT
      PUNCH 7657,NCAL
      PUNCH 7652,ZZ
 2101 IF(PINTR)1234,2102,2103
```

```
2103 PRINT 7655,METH
     PRINT 7656,NPUT
     PRINT 7657,NCAL
     PRINT 7652,ZZ
2102 GRPRF=0.
     SNVET=0.
     SUMCC=0.
     SUMKK=0.
     SPNSS=0.
     SPSSS=0.
     WABDC=0.
     WABDA=0.
     CADLN=0.
     SUCCC=0.
     SUKKK=0.
     SUMKA=0.
     SWAVG=0.
     SVEST=0.
     SUMCA=0.
     SUMLN=0.
     SUMPG=0.
     SUMN=0.
     SPN=0.
     INTT=0
 900 READ 1, NC,PR,NTR,NSK,NTE,NTY,ØPR,PRM,NB,NE,NA,NDA,PAT,DIV,INØ
     PITES=0.
     NTT=0
     PAT2=0.
     CØM2=0.
     CØM22=0.
     CØMIS=0.
     FEDTT=0.
     SNYTT=0.
     CHINT=0.
     IF(INØ-9000)1500,475,476
```

```
 475 INTT=1
     GØ TØ 2106
 476 IF(INØ-9001)1234,1400,1234
1400 INTT=2
     GØ TØ 2106
1500 IF(NTY-1)1234,10,100
  10 IF(PRM)2,1234,3
   2 PRM=-PRM
   3 VEST=C*PRM-ZZ*PR
     IF(NA-2)12,11,13
  11 GØ TØ (602,604,604,602,602),METH
 602 GRPRF=ZZ*PR-100.*(PRM-PAT)+100.*DIV
     GØ TØ 700
  12 IF(NA)1234,17,1234
  17 GØ TØ (820,603,603,820,820),METH
 820 GRPRF=ZZ*PR-100.*(PRM-ØPR)
     GØ TØ 700
 603 GRPRF=ZZ*PR-100.*(PAT-ØPR)-100.*DIV
     GØ TØ 700
 604 GRPRF=ZZ*PR
     GØ TØ 700
  13 IF(NA-7)1234,18,1234
  18 IF(PAT-PRM)1234,17,17
 100 IF(NTY-2)1234,20,200
  20 IF(PRM)25,1234,26
  25 PRM=-PRM
  26 VEST=P*PRM-ZZ*PR
     IF(NA-2)21,650,23
 650 GØ TØ (604,604,651,651,651),METH
 651 GRPRF=ZZ*PR-100.*(PAT-PRM)-100.*DIV
     GØ TØ 700
  21 IF(NA-1)1234,652,1234
 652 GØ TØ (560,560,821,821,821),METH
 821 GRPRF=ZZ*PR-100.*(ØPR-PRM)
     GØ TØ 700
```

```
560 GRPRF=ZZ*PR-100.*(ØPR-PAT)+100.*DIV
    GØ TØ 700
 23 IF(NA-7)1234,27,1234
 27 IF(PAT-PRM)652,652,1234
200 IF(NTY-3)1234,30,300
 30 IF(PRM)35,1234,36
 35 PRM=-PRM
 36 IF(METH-2)910,911,930
911 VEST=30.*PRM-ZZ*PR
    GØ TØ 914
930 IF(METH-4)910,931,932
931 IF(P-70.)1234,933,910
933 VEST=95.*PRM-ZZ*PR
    GØ TØ 914
932 IF(P-70.)1234,935,910
935 VEST=100.*PRM-ZZ*PR
    GØ TØ 914
910 VEST=(C+P)*PRM-ZZ*PR
914 IF(NA)1234,520,31
520 IF(NTR-NDA)1234,656,521
521 READ 1345,NDA2,PAT2,DIV2,DELPC
5021 GØ TØ (820,603,629,820,629),METH
656 GØ TØ (820,603,561,820,561),METH
 31 IF(NA-1)1234,522,32
522 IF(NTR-NDA)1234,5,523
523 READ 1345,NDA2,PAT2,DIV2,DELPC
    GØ TØ (613,560,821,613,821),METH
  5 GØ TØ (606,560,821,606,821),METH
606 GRPRF=ZZ*PR-100.*(PRM-PAT)+200.*DIV-100.*(ØPR-PAT)
    GØ TØ 700
 32 IF(NA-2)1234,658,34
658 GØ TØ (659,604,654,659,654),METH
654 GRPRF=ZZ*PR-100.*DIV
    GØ TØ 700
659 GRPRF=ZZ*PR+100.*DIV
```

```
    GØ TØ 700
 34 IF(NA-3)1234,37,38
 37 READ 1345, NDA2,PAT2,DIV2,DELPC
    GØ TØ (607,609,663,607,663),METH
607 GRPRF=ZZ*PR-100.*(ØPR-PAT2)+100.*DIV2
    GØ TØ 700
609 GRPRF=ZZ*PR-100.*(ØPR-PAT2)-100.*(PAT-ØPR)-100.*DIV+100.*DIV2
    GØ TØ 700
 38 IF(NA-7)1234,39,1234
 39 IF(PAT-PRM)86,660,660
660 GØ TØ (604,603,561,604,561),METH
 86 GØ TØ (606,560,604,606,604),METH
561 GRPRF=ZZ*PR-100.*(PAT-ØPR)-100.*(PAT-PRM)-200.*DIV
    GØ TØ 700
300 IF(NTY-4)1234,40,400
 40 IF(PRM)41,1234,42
 41 PRM=-PRM
 42 IF(METH-2)920,921,936
921 VEST=50.*PRM-ZZ*PR
    GØ TØ 922
936 IF(METH-4)920,937,938
937 IF(P-70.)1234,939,920
939 VEST=120.*PRM-ZZ*PR
    GØ TØ 922
938 IF(P-70.)1234,940,920
940 VEST=170.*PRM-ZZ*PR
    GØ TØ 922
920 VEST=(C+2.*P)*PRM-ZZ*PR
922 IF(NA)1234,692,44
692 IF(NTR-NDA)1234,595,596
595 GØ TØ (604,603,562,604,562),METH
596 READ 1345, NDA2,PAT2,DIV2,DELPC
    GØ TØ (604,603,597,604,597),METH
597 GRPRF=ZZ*PR-100.*(PAT-ØPR)-100.*DIV-200.*(PAT2-PRM)-200.*DIV2
    GØ TØ 700
```

```
562 GRPRF=ZZ*PR-200.*(PAT-PRM)-100.*(PAT-ØPR)-300.*DIV
    GØ TØ 700
 44 IF(NA-1)1234,1234,43
 43 IF(NA-2)1234,45,46
 45 GØ TØ (659,604,669,659,669),METH
 46 IF(NA-4)1234,48,49
 48 READ 1345,NDA2,PAT2,DIV2,DELPC
    GØ TØ (612,590,604,612,604),METH
612 GRPRF=ZZ*PR-100.*(2.*ØPR-2.*PAT2-PAT+PRM)+100.*(DIV+2.*DIV2)
    GØ TØ 700
613 GRPRF=ZZ*PR-100.*(PRM-PAT2)-100.*(ØPR-PAT)+100.*DIV+100.*DIV2
    GØ TØ 700
590 GRPRF=ZZ*PR-100.*(ØPR-PAT2)-100.*(ØPR-PAT)+100.*DIV+100.*DIV2
    GØ TØ 700
 49 IF(NA-7)1234,50,51
 50 IF(PAT-PRM)53,661,661
661 GØ TØ (604,663,562,604,562),METH
663 GRPRF=ZZ*PR-100.*(PAT-ØPR)-100.*DIV
    GØ TØ 700
 53 GØ TØ (624,615,604,624,604),METH
669 GRPRF=ZZ*PR-200.*DIV
    GØ TØ 700
615 GRPRF=ZZ*PR-200.*(ØPR-PAT)+200.*DIV
    GØ TØ 700
 51 IF(NA-8)1234,52,1234
 52 READ 1345,NDA2,PAT2,DIV2,DELPC
    GØ TØ (616,617,663,616,663),METH
616 GRPRF=ZZ*PR-200.*(ØPR-PAT2)+200.*DIV2
    GØ TØ 700
617 GRPRF=ZZ*PR-200.*(ØPR-PAT2)+200.*DIV2-100.*(PAT-ØPR)-100.*DIV
    GØ TØ 700
400 IF(NTY-5)1234,60,500
 60 IF(PRM)61,1234,62
 61 PRM=-PRM
 62 IF(METH-2)925,926,941
```

```
926 VEST=60.*PRM-ZZ*PR
    GØ TØ 927
941 IF(METH-4)925,942,943
942 IF(C-70.)1234,944,925
944 VEST=165.*PRM-ZZ*PR
    GØ TØ 927
943 IF(C-70.)1234,945,925
945 VEST=130.*PRM-ZZ*PR
    GØ TØ 927
925 VEST=(2.*C+P)*PRM-ZZ*PR
927 IF(NA)1234,1234,63
 63 IF(NA-1)1234,64,65
 64 IF(NTR-NDA)1234,592,593
592 GØ TØ (565,625,604,565,604),METH
593 READ 1345,NDA2,PAT2,DIV2,DELPC
    GØ TØ (594,625,604,594,604),METH
594 GRPRF=ZZ*PR-100.*(ØPR-PAT)+100.*DIV-200.*(PRM-PAT2)+200.*DIV2
    GØ TØ 700
624 GRPRF=ZZ*PR-100.*(PRM-PAT)+300.*DIV-200.*(ØPR-PAT)
    GØ TØ 700
565 GRPRF=ZZ*PR-200.*(PRM-PAT)-100.*(ØPR-PAT)+300.*DIV
    GØ TØ 700
625 GRPRF=ZZ*PR-100.*(ØPR-PAT)+100.*DIV
    GØ TØ 700
 65 IF(NA-2)1234,66,67
 66 GØ TØ (626,604,664,626,664),METH
626 GRPRF=ZZ*PR+200.*DIV
    GØ TØ 700
664 GRPRF=ZZ*PR-200.*DIV
    GØ TØ 700
 67 IF(NA-5)1234,115,70
115 READ 1345,NDA2,PAT2,DIV2,DELPC
    GØ TØ (604,591,665,604,665),METH
629 GRPRF=ZZ*PR-100.*(PAT-ØPR)-100.*DIV-100.*(PAT2-PRM)-100.*DIV2
    GØ TØ 700
```

```
591 GRPRF=ZZ*PR-100.*(PAT-ØPR)-100.*DIV-100.*(PAT2-ØPR)-100.*DIV2
    GØ TØ 700
665 GRPRF=ZZ*PR-100.*(PAT-2.*ØPR+2.*PAT2-PRM)-100.*(DIV+2.*DIV2)
    GØ TØ 700
 70 IF(NA-7)1234,72,71
 72 IF(PAT-PRM)117,666,666
666 GØ TØ (604,667,570,604,570),METH
667 GRPRF=ZZ*PR-200.*(PAT-ØPR)-200.*DIV
    GØ TØ 700
570 GRPRF=ZZ*PR-100.*(PAT-PRM)-200.*(PAT-ØPR)-300.*DIV
    GØ TØ 700
117 GØ TØ (565,560,604,565,604),METH
 71 IF(NA-9)1234,73,1234
 73 READ 1345,NDA2,PAT2,DIV2,DELPC
    GØ TØ (633,634,667,633,667),METH
633 GRPRF=ZZ*PR-100.*(ØPR-PAT2)+100.*DIV2
    GØ TØ 700
634 GRPRF=ZZ*PR-200.*(PAT-ØPR)-200.*DIV-100.*(ØPR-PAT2)+100.*DIV2
    GØ TØ 700
500 IF(NTY-6)1234,80,1234
 80 READ 1345,NDA2,PAT2,DIV2,DELPC
    IF(PRM)81,1234,82
 81 PRM=-PRM
 82 IF(METH-2)915,916,946
916 VEST=30.*PRM-ZZ*PR
    GØ TØ 917
946 IF(METH-4)915,947,948
947 IF(C-70.)1234,949,915
949 VEST=95.*PRM-ZZ*PR
    GØ TØ 917
948 IF(C-70.)1234,950,915
950 VEST=100.*PRM-ZZ*PR
    GØ TØ 917
915 VEST=(C+P)*PRM-ZZ*PR
917 IF(NA)1234,5020,83
```

```
5020 IF(NTR-NDA)1234,656,5021
  83 IF(NA-1)1234,575,84
 575 IF(NTR-NDA)1234,576,577
 576 GØ TØ (578,579,580,578,580),METH
 577 GØ TØ (581,579,580,581,580),METH
 578 GRPRF=ZZ*PR-100.*((ØPR-DELPC)-PAT)+200.*DIV-100.*(PRM-PAT)
     GØ TØ 700
 579 GRPRF=ZZ*PR-100.*((ØPR-DELPC)-PAT)+100.*DIV
     GØ TØ 700
 580 GRPRF=ZZ*PR+(PRM-(ØPR-DELPC))*100.
     GØ TØ 700
 581 GRPRF=ZZ*PR-100.*((ØPR-DELPC)-PAT)+100.*DIV-100.*(PRM-PAT2)+100.*D
    1IV2
     GØ TØ 700
  84 IF(NA-2)1234,658,85
  85 IF(NA-6)1234,582,38
 582 GØ TØ (579,583,663,579,663),METH
 583 GRPRF=ZZ*PR-100.*((ØPR-DELPC)-PAT)+100.*DIV2-100.*(PAT-ØPR)-100.*D
    1IV
 700 IF(NTY-1)1234,670,202
 670 GØ TØ (201,203,203,201,201),METH
 201 LNGSH=1
     GØ TØ 701
 203 LNGSH=0
     GØ TØ 701
 202 IF(NTY-2)1234,671,204
 671 GØ TØ (203,203,201,201,201),METH
 204 IF(NTY-3)1234,672,205
 672 GØ TØ (201,203,201,201,201),METH
 205 IF(NTY-4)1234,673,206
 673 GØ TØ (201,203,207,201,207),METH
 206 IF(NTY-5)1234,674,208
 674 GØ TØ (207,203,201,207,201),METH
 207 LNGSH=2
     GØ TØ 701
```

```
 208 IF(NTY-6)1234,672,1234
 701 SHLNG=LNGSH
     PØSIT=100.*PRM
     IF(PØSIT-100.)209,209,210
 209 CØMIS=6.*SHLNG
     GØ TØ 702
 210 IF(PØSIT-399.)211,211,212
 211 CØMIS=(.02*PØSIT+3.)*SHLNG
     GØ TØ 702
 212 IF(PØSIT-2399.)213,213,214
 213 CØMIS=(.01*PØSIT+7.)*SHLNG
     GØ TØ 702
 214 IF(PØSIT-4999.)215,215,216
 215 CØMIS=(.005*PØSIT+19.)*SHLNG
     GØ TØ 702
 216 CØMIS=(.001*PØSIT+39.)*SHLNG
 702 IF(NA)1234,675,321
 675 IF(NTY-2)5000,5000,5001
5000 GØ TØ (320,676,676,320,320),METH
5001 GØ TØ (320,676,676,320,676),METH
 320 SHL2=1.
     SHL22=0.
     YFED=1.
     YNYT=1.
     GØ TØ 420
 676 SHL2=2.
     SHL22=0.
     YFED=1.
     YNYT=1.
     GØ TØ 420
 321 IF(NA-1)1234,677,323
 677 IF(NTY-2)5002,5002,5003
5002 GØ TØ (322,322,324,324,324),METH
5003 GØ TØ (322,322,324,322,324),METH
 322 SHL2=1.
```

```
      SHL22=0.
      YFED=0.
      YNYT=0.
      GØ TØ 420
  323 IF(NA-2)1234,324,325
  324 SHL2=0.
      SHL22=0.
      YFED=0.
      YNYT=0.
      GØ TØ 420
  325 IF(NA-3)1234,678,327
  678 GØ TØ (326,679,680,326,680),METH
  326 SHL2=1.
      SHL22=1.
      YFED=1.
      YNYT=1.
      GØ TØ 420
  679 SHL2=2.
      SHL22=1.
      YFED=1.
      YNYT=1.
      GØ TØ 420
  680 SHL2=2.
      SHL22=0.
      YFED=1.
      YNYT=1.
      GØ TØ 420
  327 IF(NA-4)1234,681,329
  681 GØ TØ (328,328,324,328,324),METH
  328 SHL2=1.
      SHL22=1.
      YFED=0.
      YNYT=0.
      GØ TØ 420
  329 IF(NA-5)1234,682,331
```

```
682 GØ TØ (330,683,683,330,683),METH
330 SHL2=1.
    SHL22=1.
    YFED=2.
    YNYT=2.
    GØ TØ 420
683 SHL2=2.
    SHL22=2.
    YFED=2.
    YNYT=2.
    GØ TØ 420
331 IF(NA-6)1234,678,333
333 IF(NA-7)1234,324,334
334 IF(NA-8)1234,684,336
684 GØ TØ (335,685,680,335,680),METH
335 SHL2=1.
    SHL22=2.
    YFED=1.
    YNYT=1.
    GØ TØ 420
685 SHL2=2.
    SHL22=2.
    YFED=1.
    YNYT=1.
    GØ TØ 420
336 IF(NA-9)1234,686,1234
686 GØ TØ (337,687,688,337,688),METH
337 SHL2=2.
    SHL22=1.
    YFED=2.
    YNYT=2.
    GØ TØ 420
687 SHL2=4.
    SHL22=1.
    YFED=2.
```

```
      YNYT=2.
      GØ TØ 420
  688 SHL2=4.
      SHL22=0.
      YFED=2.
      YNYT=2.
      GØ TØ 420
  420 PØS2=PAT*100.
      IF(NA-2)1111,1111,1113
 1113 IF(NA-7)1110,1111,1110
 1111 PØS22=0.
      GØ TØ 1114
 1110 PØS22=PAT2*100.
 1114 IF(PØS2-100.)423,423,424
  423 CØM2=6.*SHL2
      GØ TØ 435
  424 IF(PØS2-399.)425,425,426
  425 CØM2=(.02*PØS2+3.)*SHL2
      GØ TØ 435
  426 IF(PØS2-2399.)427,427,428
  427 CØM2=(.01*PØS2+7.)*SHL2
      GØ TØ 435
  428 IF(PØS2-4999.)429,429,430
  429 CØM2=(.005*PØS2+19.)*SHL2
      GØ TØ 435
  430 CØM2=(.001*PØS2+39.)*SHL2
  435 IF(PØS22-100.)437,438,438
  437 CØM22=6.*SHL22
      GØ TØ 460
  438 IF(PØS22-399.)439,439,440
  439 CØM22=(.02*PØS22+3.)*SHL22
      GØ TØ 460
  440 IF(PØS22-2399.)441,441,442
  441 CØM22=(.01*PØS22+7.)*SHL22
      GØ TØ 460
```

```
 442 IF(PØS22-4999.)443,443,444
 443 CØM22=(.005*PØS22+19.)*SHL22
     GØ TØ 460
 444 CØM22=(.001*PØS22+39.)*SHL22
 460 IF(METH-3)1100,1101,1102
1102 IF(METH-4)1100,5010,5011
5010 IF(NTY-1)1100,1101,1100
5011 IF(METH-5)1100,1101,1234
1101 YFED=YFED+SHLNG
     YNYT=YNYT+SHLNG
1100 IF(PAT-200.)217,218,218
 217 FEDTT=.04*PAT*YFED
     GØ TØ 465
 218 FEDTT=8.0*YFED
 465 IF(PAT-20.)219,220,220
 220 SNYTT=4.*YNYT
     GØ TØ 470
 219 IF(PAT-10.)221,222,222
 222 SNYTT=3.*YNYT
     GØ TØ 470
 221 IF(PAT-5.)223,224,224
 224 SNYTT=2.*YNYT
     GØ TØ 470
 223 SNYTT=1.*YNYT
 470 SERTI=NTR-NTE
     IF(METH-1)1234,510,511
 511 IF(METH-4)512,510,512
 510 IF(C-100.)513,540,1234
 513 CHINT=.065*PRM*(100.-C)*(SERTI/365.)
     GØ TØ 540
 512 IF(METH-3)540,541,541
 541 IF(P-100.)542,540,1234
 542 CHINT=.065*PRM*(100.-P)*(SERTI/365.)
 540 CG=SNYTT+FEDTT+CØMIS+CØM2+CØM22+CHINT
     PN=GRPRF-CG
```

```
      SPN=SPN+PN
      SPNSS=SPNSS+PN**2
      SPSSS=SPSSS+PN**3
      PG=PN/VEST
      GP=PG
      LN=NTR-NTE
      IF(NA-2)1140,351,352
 1140 IF(NTY-3)530,351,351
  352 IF(NA-3)1234,533,532
  532 IF(NA-7)533,530,533
  533 IF(NDA2-NDA)530,530,534
  534 DLN=NDA2-NTE
      GØ TØ 353
  530 DLN=NDA-NTE
      GØ TØ 353
  351 DLN=LN
  353 IF(NDA)1234,225,226
  226 LNT=NDA-NTE
      PITES=1.
      GØ TØ 341
  225 LNT=0
  341 TT=1.
      IF(PG+1.)2120,2120,2121
 2120 AARØR=PG
      GØ TØ 2122
 2121 AARØR=(1.+PG)**(365./DLN)-1.
 2122 IF(PG)471,472,472
  471 PG=-PG
      TT=-1.
  472 CARØR=(365./DLN)*LØGF(1.+PG)*TT
      SUMCA=SUMCA+CARØR
      SUMCC=SUMCC+CARØR**2
      SUCCC=SUCCC+CARØR**3
      SUMKA=SUMKA+AARØR
      SUMKK=SUMKK+AARØR**2
```

```
      SUKKK=SUKKK+AARØR**3
      SWAVG=SWAVG+VEST*CARØR*DLN
      SNVET=SNVET+VEST*AARØR*DLN
      CADLN=CADLN+VEST*DLN
      WABDA=WABDA+AARØR*DLN
      WABDC=WABDC+CARØR*DLN
      SVEST=SVEST+VEST
      SUMN=SUMN+1.
      SUMPG=SUMPG+GP
      SUMLN=SUMLN+DLN
      IF(PNCHU)1234,360,2105
 2105 IF(PITES)1234,343,342
  342 PUNCH 800,INØ,NC,NSK,NTY,NA,NTE,LN,LNT,VEST,GRPRF,PN,GP,CARØR,AARØ
     1R
      GØ TØ 360
  343 PUNCH 801,INØ,NC,NSK,NTY,NA,NTE,LN,VEST,GRPRF,PN,GP,CARØR,AARØR
  360 IF(PINTR)1234,2106,2107
 2107 IF(PITES)1234,2108,2109
 2109 PRINT 800,INØ,NC,NSK,NTY,NA,NTE,LN,LNT,VEST,GRPRF,PN,GP,CARØR,AARØ
     1R
      GØ TØ 2106
 2108 PRINT 801,INØ,NC,NSK,NTY,NA,NTE,LN,VEST,GRPRF,PN,GP,CARØR,AARØR
 2106 IF(INTT)1234,900,1900
 1900 AVCAR=SUMCA/SUMN
      AVKAR=SUMKA/SUMN
      ASPG=SUMPG/SUMN
      PSAG=ASPG
      ASLN=SUMLN/SUMN
      AVEST=SVEST/SUMN
      IF(SUMN-1.)15000,15000,15001
15001 AASIG=SQRTF((SUMKK-(SUMN*AVKAR**2))/(SUMN-1.))
      CASIG=SQRTF((SUMCC-(SUMN*AVCAR**2))/(SUMN-1.))
      PNSIG=SQRTF((SPNSS-(SUMN*(SPN/SUMN)**2))/(SUMN-1.))
      PNSKW=(SPSSS/SUMN-3.*(SPN/SUMN)*(SPNSS/SUMN)+2.*(SPN/SUMN)**3)/PNS
     1IG**3
```

```
      AASKW=(SUKKK/SUMN-3.*AVKAR*(SUMKK/SUMN)+2.*AVKAR**3)/AASIG**3
      CASKW=(SUCCC/SUMN-3.*AVCAR*(SUMCC/SUMN)+2.*AVCAR**3)/CASIG**3
15000 AWTSM=SWAVG/CADLN
      ANTSM=SNVET/CADLN
      ABDAW=WABDA/SUMLN
      ABDCW=WABDC/SUMLN
      SPN=SPN/SUMN
      MNSU=SUMN
      NASL=ASLN
      IF(ASPG)481,482,482
  481 TT=-1
      ASPG=-ASPG
      IF(SUMN-1.)2112,2112,482
  482 CRØAR=(365./ASLN)*LØGF(1.+ASPG)*TT
      IF(PNCHU)1234,2110,2111
 2111 PUNCH 2233,AVKAR
      PUNCH 9568,AASIG
      PUNCH 9571,AASKW
      PUNCH 4567,AVCAR
      PUNCH 9569,CASIG
      PUNCH 9572,CASKW
      PUNCH 5657,ANTSM
      PUNCH 5567,AWTSM
      PUNCH 26200,ABDAW
      PUNCH 26201,ABDCW
      PUNCH 6567,CRØAR
      PUNCH 8567,PSAG
      PUNCH 7567,SPN
      PUNCH 9570,PNSIG
      PUNCH 9573,PNSKW
      PUNCH 2345,AVEST
      PUNCH 9567,MNSU
      PUNCH 3345,NASL
      PUNCH 27421
 2110 IF(PINTR)1234,2112,2113
```

```
 2113 PRINT 2233,AVKAR
      PRINT 9568,AASIG
      PRINT 9571,AASKW
      PRINT 4567,AVCAR
      PRINT 9569,CASIG
      PRINT 9572,CASKW
      PRINT 5657,ANTSM
      PRINT 5567,AWTSM
      PRINT 26200,ABDAW
      PRINT 26201,ABDCW
      PRINT 6567,CRØAR
      PRINT 8567,PSAG
      PRINT 7567,SPN
      PRINT 9570,PNSIG
      PRINT 9573,PNSKW
      PRINT 2345,AVEST
      PRINT 9567,MNSU
      PRINT 3345,NASL
      PRINT 27421
 2112 GØ TØ (1300,1200),INTT
 2233 FØRMAT(49H AVERAGE ØF INDIV. CØMPØUND INT. METHØD R.ØF R. =F8.3)
 4567 FØRMAT(49H AVERAGE ØF INDIV.MØD.CØMPØUND I. METH R.ØF R.  =F8.3)
 5657 FØRMAT(49H INV. AND DUR.WT.AVG.ØF CØMPØUND I.METH.R.ØF R. =F8.3)
 5567 FØRMAT(49H INV.AND DUR.WT.AVG.ØF MØD.CØMP.I.R.ØF R.       =F8.3)
26200 FØRMAT(49H DUR. WT. AVG.ØF CØMP.INT.METH.R.ØF R.          =F8.3)
26201 FØRMAT(49H DUR.WT.AVG. ØF MØD. CØMP.INT.METH.R.ØF R.      =F8.3)
 6567 FØRMAT(49H AVERAGE RATE ØF ANNUAL RETURN                  =F8.3)
 7567 FØRMAT(49H THE AVERAGE DØLLAR GAIN PER ØPTIØN CØNTRCT SØLD=F7.2)
 8567 FØRMAT(49H THE AVERAGE RETURN PER CØNTRACT WRITTEN        =F8.3)
 9567 FØRMAT(48H NØ.ØF ØPTIØN CØNTRACTS CALCULATIØNS BASED ØN  =I5)
 2345 FØRMAT(47H THE AVERAGE INVESTMENT PER CØNTRACT          =F9.2)
 3345 FØRMAT(48H THE AVERAGE DURATIØN ØF AN ØPTIØN CØNTRACT    =I5)
 7656 FØRMAT(31H (2) RESULTS ASSUME PUT CØVEREDI4,9H PER CENT)
 7657 FØRMAT(32H (3) RESULTS ASSUME CALL CØVEREDI4,9H PER CENT)
 7652 FØRMAT(32H (4) RESULTS ASSUME WRITER KEPT F5.3,12H ØF PREMIUM.)
```

```
 3567 FØRMAT(F4.0,F4.0)
 2567 FØRMAT(F5.3)
  800 FØRMAT(I5,I4,I4,I2,I2,I5,I4,I4,F9.2,F9.2,F9.2,F8.3,F8.3,F7.3)
  801 FØRMAT(I5,I4,I4,I2,I2,I5,I4,4X,F9.2,F9.2,F9.2,F8.3,F8.3,F7.3)
    1 FØRMAT(I3,F8.2,I5,I4,I5,I2,F8.3,F9.3,I2,I2,I2,I5,F8.3,F5.2,5X,I5)
 9568 FØRMAT(49H STD.DEV.ØF R.ØF R., CØMPØUND INTEREST METHØD   =F8.3)
 9569 FØRMAT(49H STD.DEV.ØF R.ØF R., MØD. CØMPØUND INT. METHØD  =F8.3)
 9570 FØRMAT(49H STD. DEV. ØF DØLLAR GAIN PER CØNTRACT          =F7.2)
 9571 FØRMAT(49H SKEWNESS ØF R. ØF R., CØMPØUND INTEREST METHØD =F8.3)
 9572 FØRMAT(49H SKEWNESS ØF R.ØF R., MØD. CØMPØUND I. METHØD   =F8.3)
 9573 FØRMAT(49H SKEWNESS ØF DØLLAR GAIN PER CØNTRACT           =F8.3)
 7655 FØRMAT(26H ASSUMPTIØNS, (1) STRATEGYI4,30H IS USED IN THESE CALCUL
     1ATIØNS)
 1345 FØRMAT(48X,2X,I5,F8.3,F5.2,F5.2)
 1456 FØRMAT(35H THIS ØPTIØN NØT INCLUDED IN TØTALSI4)
 1457 FØRMAT(I4)
27421 FØRMAT(1H1)
 1234 PUNCH 1456,INØ
      GØ TØ 900
      END
```

APPENDIX 5

APPENDIX 5

Column Key for the Option Writing Profitability Results Presented on the Following Pages

Column	1	Option I. D. number
	2	Writer
	3	Stock I. D. number
	4	Option type
	5	Action taken
	6	Trade date
	7	Nominal option duration
	8	Actual option duration if exercised
	9	Investment
	10	Gross profit
	11	Net profit
	12	Rate of return on option contract
	13	Continuous compounding annual rate of return
	14	Compound interest annual rate of return

BELØW ARE THE DETAILED RESULTS ASSØCIATED WITH WRITING ØPTIØN WHEN CALLS ARE HEDGED AND PUTS ARE MARGINED

ASSUMPTIØNS, (1) STRATEGY 1 IS USED IN THESE CALCULATIØNS
(2) RESULTS ASSUME PUT CØVERED 100 PER CENT
(3) RESULTS ASSUME CALL CØVERED 100 PER CENT
(4) RESULTS ASSUME WRITER KEPT 0.865 ØF PREMIUM.

1	1	115	3	0	5902	191	186	7391.13	596.37	510.54	0.069	0.128	0.136
2	1	149	5	5	5890	191	191	9153.25	821.75	666.70	0.073	0.134	0.144
3	1	9	1	2	5976	89		2325.31	287.19	255.75	0.110	0.428	0.534
4	1	28	3	0	5867	191	186	2779.69	270.31	211.49	0.076	0.140	0.150
5	1	231	3	0	5858	193	193	5417.50	432.50	357.78	0.066	0.121	0.129
6	1	157	1	0	5854	191	191	2290.84	221.66	150.96	0.066	0.122	0.130
7	1	146	1	0	5941	94	94	1261.47	113.53	70.17	0.056	0.210	0.234
8	1	14	1	0	5806	191	168	2283.75	216.25	144.87	0.063	0.134	0.143
9	1	93	3	0	5856	95	95	4515.50	259.50	191.99	0.043	0.160	0.173
10	1	69	1	0	5755	189	182	3168.19	331.81	249.37	0.079	0.152	0.164
11	1	153	1	0	5743	194	105	3382.38	367.62	283.45	0.084	0.280	0.323
12	1	96	3	0	5798	86	65	4915.50	322.00	250.52	0.051	0.211	0.235
13	1	221	3	0	5752	95	95	3844.56	205.44	144.57	0.038	0.142	0.152
14	1	231	1	2	5738	90		2730.38	-155.38	-189.00	-0.069	-0.271	-0.252
15	3	104	1	2	5895	191		2583.75	-33.75	-66.75	-0.026	-0.049	-0.049
16	3	212	3	1	5842	193	193	3268.88	306.12	256.50	0.078	0.143	0.154
17	3	212	3	1	5842	193	193	3268.88	306.12	256.50	0.078	0.143	0.154
18	3	41	3	0	5842	193	193	5107.38	367.62	294.66	0.058	0.106	0.112
19	3	69	1	2	5937	95		3659.75	90.25	51.44	0.014	0.054	0.055
20	3	33	1	0	5833	192	107	1107.75	129.75	83.99	0.076	0.249	0.283
21	3	138	1	2	5916	109	109	4794.56	-457.06	-501.06	-0.105	-0.333	-0.309
23	3	203	3	0	5933	90	21	5147.25	302.75	228.90	0.044	0.176	0.193
24	3	41	3	1	5939	65	65	6872.25	-622.25	-693.81	-0.101	-0.540	-0.450
25	3	14	3	0	5806	191	168	4654.00	346.00	274.62	0.059	0.110	0.116
26	3	104	3	0	5800	195	195	5000.63	324.37	254.35	0.051	0.093	0.097
27	3	41	1	0	5881	65	65	3014.50	173.00	97.85	0.032	0.179	0.196
28	3	241	3	0	5842	95	95	3630.38	194.62	133.19	0.037	0.138	0.148

29	3	138	3	7	5826	97	97	7902.63	497.37	457.37	0.058	0.212	0.236
30	3	69	3	1	5825	95	95	7018.19	126.81	52.81	0.008	0.029	0.029
31	3	120	3	0	5826	97	97	4515.50	259.50	191.45	0.042	0.156	0.169
32	3	59	3	0	5836	66	66	7222.25	302.75	220.34	0.031	0.166	0.181
33	3	227	3	0	5836	66	66	6690.50	259.50	177.24	0.026	0.145	0.156
34	3	229	3	0	5806	65	36	6190.50	259.50	181.80	0.029	0.163	0.176
35	2	122	1	2	5812	183		2147.94	464.56	433.81	0.202	0.367	0.443
36	2	29	2	1	5834	196	196	2287.13	-412.13	-437.87	-0.191	-0.326	-0.327
38	2	122	1	0	5777	192	191	1831.38	281.12	214.54	0.117	0.212	0.236
39	2	128	1	0	5811	95	95	2633.75	216.25	142.25	0.054	0.202	0.224
40	2	128	1	0	5811	95	95	2633.75	216.25	142.25	0.054	0.202	0.224
41	2	29	3	1	5786	96	96	4654.00	196.00	133.50	0.029	0.108	0.114
42	2	117	2	1	5773	67	67	3321.25	121.25	85.19	0.026	0.138	0.148
43	4	2	3	1	5958	95	95	3893.88	-448.88	-500.88	-0.129	-0.465	-0.411
44	4	174	1	2	5952	90		5050.63	-200.63	-245.00	-0.049	-0.192	-0.183
45	4	149	3	0	5939	96	26	6075.63	349.37	270.72	0.045	0.166	0.180
46	4	140	1	0	5931	97	97	4150.63	324.37	234.48	0.056	0.207	0.230
47	4	140	1	0	5938	92	92	3938.13	324.37	235.48	0.060	0.230	0.259
48	4	110	3	1	5933	90	90	6939.13	-904.13	-975.44	-0.141	-0.533	-0.459
49	4	110	1	2	5941	62		3240.50	-240.50	-277.00	-0.085	-0.483	-0.409
50	4	32	3	0	5930	65	65	11381.00	669.00	571.63	0.050	0.275	0.317
51	4	41	3	1	5988	97	34	6272.25	-309.75	-378.81	-0.060	-0.221	-0.209
52	32	41	3	1	5988	97	97	6272.25	-247.25	-316.50	-0.050	-0.185	-0.177
53	13	225	3	1	5997	95	34	9031.00	-1251.00	-1333.69	-0.148	-0.529	-0.459
54	13	221	3	1	5981	96	96	5090.50	-28.50	-92.38	-0.018	-0.068	-0.067
55	13	183	3	0	5868	191	191	3237.13	237.87	184.91	0.057	0.106	0.112
56	13	85	1	2	5980	90		3697.25	-522.25	-561.25	-0.152	-0.573	-0.487
57	13	184	1	0	5874	191	160	3355.69	356.81	275.05	0.082	0.180	0.197
58	13	193	1	2	5968	96		3178.00	-315.50	-351.69	-0.111	-0.399	-0.360
59	13	134	3	0	5969	95	91	4090.50	259.50	193.24	0.047	0.177	0.194
60	13	134	3	0	5968	95	81	4040.50	259.50	195.69	0.048	0.182	0.199
61	13	14	1	0	5905	194	70	2412.13	237.87	165.75	0.069	0.347	0.414
62	13	140	1	0	5876	191	132	2670.56	291.94	210.82	0.079	0.210	0.234
63	13	41	3	1	5944	95	59	6796.56	-459.06	-530.56	-0.078	-0.289	-0.268
64	13	86	6	1	5973	65	65	8354.00	-5.00	-85.38	-0.010	-0.057	-0.056

65	13	194	1	0	5937	95	95	5185.75	389.25	293.90	0.057	0.212	0.236
66	13	163	3	2	5931	97		8534.38	540.62	498.94	0.058	0.214	0.238
67	13	210	6	1	5960	65	65	8447.25	-122.25	-202.75	-0.024	-0.133	-0.128
68	13	110	3	1	5925	96	96	6285.75	-250.75	-320.38	-0.051	-0.189	-0.180
69	13	120	3	1	5920	101	101	4839.81	0.19	-62.81	-0.013	-0.047	-0.046
70	13	120	3	1	5916	95	95	4943.88	-78.88	-142.00	-0.029	-0.109	-0.106
71	13	163	3	0	5931	65	65	8642.50	432.50	340.95	0.039	0.217	0.243
72	13	148	1	2	5906	90		6710.06	114.94	68.76	0.010	0.041	0.042
73	13	120	3	1	5920	101	101	4839.81	0.19	-62.81	-0.013	-0.047	-0.046
74	13	53	3	0	5874	95	95	11994.50	605.50	508.34	0.042	0.159	0.173
75	13	110	3	1	5955	31	31	6425.63	-325.63	-395.75	-0.062	-0.704	-0.527
76	13	100	1	0	5871	95	94	3668.88	281.12	192.22	0.052	0.198	0.219
77	13	126	3	0	5864	95	88	7282.38	367.62	280.04	0.038	0.145	0.156
78	13	149	3	0	5899	96	67	6568.19	356.81	276.30	0.042	0.157	0.170
79	13	149	3	0	5899	96	96	6568.19	356.81	276.84	0.042	0.157	0.170
80	13	32	1	0	5890	96	96	5605.69	356.81	259.38	0.046	0.172	0.188
81	13	126	3	0	5885	95	95	7885.75	389.25	300.51	0.038	0.144	0.155
82	13	28	3	0	5874	95	91	2887.81	162.19	109.27	0.038	0.143	0.153
83	13	104	3	0	5912	32	32	5683.75	216.25	142.89	0.025	0.283	0.327
84	13	25	3	0	5868	65	65	10857.38	367.62	271.75	0.025	0.139	0.149
85	13	194	3	0	5833	97	97	10481.00	519.00	423.43	0.040	0.149	0.161
86	13	5	3	0	5833	97	97	6675.63	374.37	290.98	0.044	0.161	0.174
87	13	210	3	0	5856	67	67	8897.25	302.75	212.64	0.024	0.129	0.137
88	13	203	3	0	5827	96	86	4147.94	239.56	173.65	0.042	0.156	0.169
89	13	123	3	0	5833	65	65	14212.09	437.91	336.86	0.024	0.132	0.141
90	10	241	3	0	6022	65	64	5187.13	237.87	166.31	0.032	0.177	0.194
91	10	1	3	0	6030	65	58	13192.50	432.50	333.55	0.025	0.140	0.151
92	10	102	1	0	5988	90	83	4162.13	237.87	148.09	0.036	0.154	0.166
93	10	65	3	0	6009	65	57	16258.00	692.00	587.35	0.036	0.199	0.221
94	10	232	3	0	5920	66	66	17209.38	540.62	437.24	0.025	0.139	0.149
95	10	185	1	0	5917	90	82	5730.69	356.81	259.57	0.045	0.197	0.218
96	10	21	3	1	5960	65	65	11442.50	-3717.50	-3800.50	-0.332	-1.610	-0.896
97	10	216	5	5	5933	95	95	27903.50	1384.00	1172.47	0.042	0.158	0.171
98	10	188	1	0	5951	84	81	11085.06	814.94	702.84	0.063	0.277	0.319
99	10	188	3	0	5938	97	90	22762.00	1038.00	925.92	0.041	0.150	0.162

100	10	47	1	0	5960	96	96	3140.50	272.00	193.36	0.062	0.227	0.255
101	10	23	3	0	5944	95	66	14192.50	432.50	332.49	0.023	0.089	0.093
102	10	232	3	1	5987	98	98	17269.50	-19.50	-114.99	-0.007	-0.025	-0.025
103	16	32	3	1	5960	90	90	12678.25	-1383.25	-1473.69	-0.116	-0.446	-0.394
104	16	219	1	2	5944	95		18792.75	-4380.25	-4439.04	-0.236	-0.815	-0.645
105	16	149	3	2	5959	65		6829.00	346.00	309.06	0.045	0.249	0.282
106	16	241	3	0	5937	91	91	4329.00	346.00	276.96	0.064	0.249	0.282
107	16	241	3	0	5937	91	91	4329.00	346.00	276.96	0.064	0.249	0.282
108	16	120	3	1	5920	101	101	4883.06	-43.06	-106.06	-0.022	-0.078	-0.076
109	16	41	3	1	5903	97	97	6839.81	-439.81	-511.63	-0.075	-0.271	-0.254
110	16	85	3	0	5909	95	95	6495.88	454.12	375.31	0.058	0.216	0.241
111	16	174	3	0	5898	67	50	9621.56	378.44	283.89	0.030	0.158	0.172
112	20	159	1	2	5720	65		3902.00	198.00	158.62	0.041	0.224	0.251
113	20	230	3	2	5721	65		9729.00	346.00	301.96	0.031	0.172	0.187
114	20	14	1	0	5595	195	195	1935.44	227.06	162.34	0.084	0.151	0.163
115	20	178	2	1	5597	193	193	6167.50	155.00	109.79	0.018	0.033	0.034
116	20	208	1	2	5695	95		2423.28	51.72	19.66	0.008	0.031	0.032
117	20	161	1	2	5603	194		7746.50	-959.00	-1006.53	-0.130	-0.230	-0.230
118	20	161	1	2	5615	196		7746.50	-321.50	-369.03	-0.048	-0.087	-0.087
119	20	224	1	2	5619	194		4171.88	-534.38	-576.94	-0.138	-0.244	-0.244
120	20	241	1	2	5623	195		2312.13	-549.63	-581.37	-0.251	-0.420	-0.418
121	20	204	3	0	5738	95	95	6679.00	346.00	261.93	0.039	0.148	0.159
122	20	149	3	0	5769	65	64	10167.50	470.00	373.60	0.037	0.203	0.225
123	20	100	1	0	5591	193	193	2625.63	324.37	249.33	0.095	0.172	0.187
124	20	132	1	2	5682	95		6017.50	-742.50	-787.95	-0.131	-0.473	-0.417
125	20	188	1	0	5666	96	96	6861.44	313.56	212.84	0.031	0.116	0.123
126	20	149	3	1	5707	62	62	10199.25	475.75	387.10	0.038	0.219	0.245
127	20	116	1	0	5864	192	182	4724.25	475.75	379.85	0.080	0.155	0.168
129	20	14	1	2	5743	194		2008.75	816.25	787.00	0.392	0.622	0.863
130	20	204	3	0	5769	192	184	7331.00	519.00	429.06	0.059	0.108	0.114
131	20	14	1	0	5770	192	184	1987.47	200.03	132.29	0.067	0.128	0.136
132	20	14	3	0	5806	191	168	4654.00	346.00	274.62	0.059	0.110	0.116
133	20	46	1	0	5813	191	190	2668.88	306.12	228.04	0.085	0.158	0.171
134	20	14	3	0	5787	95	94	4626.31	248.69	179.45	0.039	0.146	0.157
135	20	46	1	0	5794	95	95	2657.06	205.44	130.56	0.049	0.184	0.202

136	20	71	3	0	5820	96	90	5547.25	302.75	227.43	0.041	0.153	0.165
137	20	150	3	0	5860	95	95	6232.38	367.62	290.43	0.047	0.175	0.191
138	20	159	3	0	5812	65	65	8661.44	413.56	324.35	0.037	0.206	0.229
139	20	178	2	2	5828	95		6721.25	216.25	216.25	0.032	0.122	0.129
140	20	58	3	1	5847	65	65	8864.13	110.87	27.25	0.003	0.017	0.017
141	20	150	1	0	5855	65	65	3130.38	194.62	116.29	0.037	0.205	0.227
142	20	150	3	0	5857	66	57	6218.88	281.12	203.57	0.033	0.178	0.195
143	20	159	3	1	5891	67	67	9225.63	-175.63	-260.13	-0.028	-0.151	-0.144
144	20	161	3	1	5955	66	66	17478.25	-478.25	-573.90	-0.033	-0.179	-0.169
145	88	104	3	0	5815	192	192	4750.63	324.37	255.17	0.054	0.099	0.105
146	88	120	1	0	5819	192	192	2103.00	234.50	167.85	0.080	0.146	0.157
147	88	59	1	0	5818	46	46	3325.66	274.34	194.98	0.059	0.452	0.572
148	9	96	3	0	6022	65	65	6101.31	248.69	173.26	0.028	0.157	0.170
149	9	96	3	0	6022	65	65	6101.31	248.69	173.26	0.028	0.157	0.170
150	9	6	3	0	6022	70	70	11467.50	432.50	335.96	0.029	0.151	0.162
151	9	6	3	0	6022	70	70	11467.50	432.50	335.96	0.029	0.151	0.162
152	9	51	4	4	6003	89	89	8706.00	-931.00	-1028.88	-0.118	-0.458	-0.403
153	9	111	3	2	6022	65		4780.38	194.62	163.19	0.034	0.188	0.207
154	9	111	3	2	6022	65		4780.38	194.62	163.19	0.034	0.188	0.207
155	9	101	3	0	6022	65	65	6451.31	248.69	169.48	0.026	0.146	0.157
156	9	101	3	0	6022	65	65	6451.31	248.69	169.48	0.026	0.146	0.157
157	9	77	3	0	6022	65	65	3591.19	183.81	125.75	0.035	0.193	0.213
158	9	59	3	1	6022	65	65	7215.50	-70.50	-144.88	-0.020	-0.112	-0.108
159	9	59	3	1	6022	65	65	7215.50	-70.50	-144.88	-0.020	-0.112	-0.108
160	9	180	3	1	6022	65	59	7104.69	-87.19	-161.00	-0.023	-0.126	-0.121
161	9	180	3	1	6022	65	65	7104.69	-99.69	-173.44	-0.024	-0.135	-0.130
162	61	232	1	0	5748	191	108	6450.25	562.25	461.86	0.072	0.234	0.263
163	61	206	3	0	5826	65	56	7637.13	237.87	151.41	0.020	0.110	0.117
164	61	206	1	0	5693	195	195	3795.56	291.94	205.27	0.054	0.099	0.104
165	61	34	1	0	5688	194	194	4038.13	324.37	236.73	0.059	0.107	0.113
166	61	216	2	2	5695	201		7461.75	475.75	475.75	0.064	0.112	0.119
167	61	232	3	0	5703	195	195	15648.50	951.50	849.33	0.054	0.099	0.104
168	61	34	5	5	5826	65	65	11584.06	378.44	206.77	0.018	0.099	0.104
169	61	232	1	0	5778	90	90	6794.88	367.62	267.16	0.039	0.156	0.169
170	61	123	3	0	5798	65	37	13567.50	432.50	333.23	0.025	0.136	0.146

172	61	232	2	2	5657	193		7606.00	519.00	519.00	0.068	0.125	0.133
173	61	232	1	2	5658	192		7429.63	507.87	460.77	0.062	0.114	0.121
174	61	34	3	1	5651	196	196	8409.38	-44.38	-125.06	-0.015	-0.027	-0.028
175	61	216	6	0	5765	67	67	14707.38	567.62	466.66	0.032	0.170	0.186
176	61	123	3	0	5765	67	67	14078.31	421.69	322.36	0.023	0.123	0.131
177	61	123	3	0	5766	66	66	14092.50	432.50	333.16	0.024	0.129	0.138
178	61	206	1	2	5636	193		3854.00	21.00	-19.00	-0.005	-0.009	-0.009
179	61	34	1	2	5744	60		3914.50	60.50	21.06	0.005	0.033	0.033
180	61	206	1	2	5701	96		4007.06	55.44	15.37	0.004	0.015	0.015
182	61	34	2	1	5688	95	95	4189.50	-92.00	-131.19	-0.031	-0.118	-0.115
183	61	216	2	2	5670	92		6888.13	324.37	324.37	0.047	0.183	0.200
184	9	89	3	0	6017	67	48	8407.38	367.62	277.90	0.033	0.177	0.194
185	9	89	3	0	6017	67	67	8407.38	367.62	276.28	0.033	0.176	0.193
186	9	129	2	1	6022	64	22	9792.50	45.00	-3.84	-0.000	-0.007	-0.006
187	61	34	1	0	5868	191	191	3927.31	335.19	248.72	0.063	0.117	0.125
188	61	34	1	0	5868	191	191	3927.31	335.19	248.72	0.063	0.117	0.125
189	61	34	1	0	5884	190	174	4012.44	400.06	312.51	0.078	0.157	0.170
190	9	9	3	0	5973	97	97	4551.31	248.69	180.85	0.040	0.147	0.158
191	9	158	3	1	6008	65	41	7725.63	-63.13	-140.25	-0.018	-0.101	-0.098
192	9	101	1	0	5968	90	90	3060.44	227.06	149.79	0.049	0.194	0.214
193	9	77	3	1	5952	97	97	4222.25	-252.25	-308.63	-0.073	-0.265	-0.248
194	9	59	3	1	5948	98	88	7589.13	-319.13	-395.56	-0.052	-0.189	-0.181
195	9	59	3	1	5948	98	88	7589.13	-319.13	-395.56	-0.052	-0.189	-0.181
196	9	180	4	2	5952	90	90	10891.13	623.87	585.75	0.054	0.212	0.237
197	9	59	3	1	5973	65	42	7693.88	-198.88	-275.63	-0.036	-0.198	-0.185
198	9	14	3	0	5973	65	65	5962.13	237.87	161.74	0.027	0.150	0.162
199	9	51	3	1	5973	65	65	5562.13	-87.13	-153.19	-0.028	-0.153	-0.145
200	9	77	3	1	5946	96	96	3897.25	72.75	18.00	0.005	0.018	0.018
201	9	90	3	1	5962	66	66	12274.25	300.75	210.12	0.017	0.094	0.098
202	9	13	3	1	5932	98	98	5935.75	1164.25	1092.81	0.184	0.629	0.876
203	9	77	3	1	5930	95	95	3804.69	-134.69	-187.31	-0.049	-0.185	-0.176
204	9	123	3	0	5960	65	65	15659.38	540.62	438.71	0.028	0.155	0.168
205	61	206	1	0	5819	192	192	3590.50	259.50	173.88	0.048	0.090	0.094
206	9	77	1	2	5926	95		1916.19	21.31	-6.69	-0.003	-0.013	-0.013
207	9	163	1	2	5910	90		4847.25	15.25	-28.90	-0.006	-0.024	-0.024

208	9	163	3	1	5920	66	27	9742.50	-267.50	-354.21	-0.036	-0.197	-0.185
209	61	206	3	0	5888	95	66	8629.00	346.00	255.98	0.030	0.112	0.119
210	61	206	3	0	5888	95	66	8629.00	346.00	255.98	0.030	0.112	0.119
211	9	232	3	0	5916	65	65	16581.00	519.00	415.74	0.025	0.139	0.149
212	61	34	2	2	5787	192		3768.88	281.12	281.12	0.075	0.137	0.147
213	61	34	4	0	5780	192	166	11339.75	735.25	647.14	0.057	0.106	0.111
214	61	216	1	0	5871	95	94	8524.25	475.75	370.28	0.043	0.165	0.180
215	61	216	2	2	5870	95		8741.50	346.00	346.00	0.040	0.149	0.161
216	61	232	2	2	5769	192		7353.00	259.50	259.50	0.035	0.066	0.068
217	61	123	3	1	5895	65	46	16352.63	-40.13	-134.70	-0.008	-0.046	-0.045
218	61	206	4	0	5752	192	192	11544.50	605.50	516.52	0.045	0.083	0.087
219	61	206	4	0	5752	192	173	11544.50	605.50	518.41	0.045	0.084	0.087
220	61	232	6	0	5738	192	153	14141.75	958.25	856.91	0.061	0.112	0.118
221	61	34	1	0	5832	91	73	3697.94	227.06	140.46	0.038	0.186	0.205
222	61	34	3	0	5849	67	57	8200.63	324.37	235.82	0.029	0.154	0.167
223	61	34	3	0	5849	67	57	8200.63	324.37	235.82	0.029	0.154	0.167
224	61	216	3	0	5868	65	42	17481.00	519.00	413.96	0.024	0.131	0.140
225	29	144	3	0	5910	97	97	4897.25	302.75	228.85	0.047	0.172	0.188
226	29	104	3	1	5913	95	95	5668.88	-280.88	-347.13	-0.061	-0.228	-0.216
227	29	144	3	0	5913	95	95	4910.75	389.25	315.44	0.064	0.239	0.270
228	29	104	3	1	5916	95	95	5693.88	-380.88	-447.00	-0.079	-0.290	-0.270
229	29	104	3	1	5917	97	97	5568.88	-305.88	-371.56	-0.067	-0.243	-0.229
230	29	144	3	0	5909	65	65	4537.13	237.87	165.91	0.037	0.202	0.223
231	28	138	3	3	5890	191	83	7740.44	34.06	-92.36	-0.012	-0.023	-0.023
232	28	234	3	1	5798	191	191	11185.00	-870.00	-959.14	-0.086	-0.157	-0.157
233	28	215	3	1	5799	191	191	2579.00	-1116.50	-1152.50	-0.447	-0.706	-0.677
234	28	215	1	2	5799	191		1257.06	-519.56	-541.19	-0.431	-0.684	-0.659
235	28	130	3	0	5848	97	97	8667.50	482.50	389.28	0.045	0.165	0.180
236	28	87	3	0	5848	96	96	8560.75	389.25	298.95	0.035	0.131	0.139
237	28	187	3	0	5849	95	83	8989.13	385.87	293.44	0.033	0.123	0.131
238	28	27	3	0	5871	66	66	6957.38	367.62	283.15	0.041	0.221	0.247
239	28	187	3	0	5842	95	85	8985.75	389.25	297.01	0.033	0.125	0.133
240	28	215	3	1	5799	96	96	2697.94	-85.44	-127.19	-0.047	-0.175	-0.168
241	28	100	3	0	5798	97	94	7264.13	410.87	325.79	0.045	0.165	0.179
242	28	27	3	2	5805	65		6782.38	367.62	330.75	0.049	0.267	0.307

243	30	149	5	5	5890	191	190	9003.25	821.75	667.33	0.074	0.137	0.147
244	30	149	1	0	5941	193	122	2960.75	389.25	310.11	0.105	0.298	0.347
245	30	14	3	0	5806	191	168	4654.00	346.00	274.62	0.059	0.110	0.116
246	30	130	1	2	5910	97		5154.00	421.00	376.50	0.073	0.265	0.304
247	30	14	1	0	5770	192	184	1962.47	200.03	132.54	0.068	0.130	0.138
248	30	182	3	0	5818	95	94	10367.50	482.50	386.84	0.037	0.141	0.151
249	30	59	3	0	5818	95	88	6579.00	346.00	265.22	0.040	0.152	0.164
250	30	12	1	0	5787	66	27	6609.75	302.75	203.27	0.031	0.409	0.506
251	30	110	3	1	5926	60	60	6425.63	-300.63	-370.81	-0.058	-0.341	-0.303
252	30	25	2	2	5961	32		5175.63	324.37	324.37	0.063	0.693	1.000
253	30	168	2	2	5842	193		5599.25	475.75	475.75	0.085	0.154	0.167
254	30	103	6	2	5968	67		13792.50	432.50	386.39	0.028	0.151	0.162
255	32	104	1	2	5895	191		2583.75	-33.75	-66.75	-0.026	-0.049	-0.049
256	32	18	1	0	5874	191	191	11001.25	648.75	537.86	0.049	0.091	0.096
257	32	149	1	0	5982	90	90	3299.63	237.87	158.81	0.048	0.191	0.210
258	32	216	3	0	5856	193	88	16733.63	1016.37	911.31	0.054	0.100	0.105
259	32	174	3	1	5952	90	90	10212.75	-417.75	-505.45	-0.049	-0.196	-0.186
260	32	120	1	2	5828	193		2115.50	272.00	241.25	0.114	0.204	0.227
261	32	174	3	0	5806	191	175	7833.00	692.00	601.20	0.077	0.141	0.152
262	32	81	2	1	5804	191	191	10586.38	476.12	426.24	0.040	0.075	0.078
263	32	104	3	1	5800	195	195	5000.63	525.37	460.44	0.092	0.165	0.179
264	32	11	3	0	5924	65	28	15689.75	735.25	631.42	0.040	0.222	0.248
265	32	41	3	1	5892	95	95	6425.63	249.37	177.94	0.028	0.105	0.111
266	32	41	3	0	5868	97	97	5918.88	281.12	205.33	0.035	0.128	0.137
267	32	108	3	0	5860	91	60	10445.88	454.12	358.57	0.034	0.135	0.145
268	32	238	3	1	5840	97	85	9568.19	-720.69	-805.50	-0.084	-0.304	-0.282
269	32	120	3	0	5825	95	94	4540.50	259.50	191.59	0.042	0.159	0.172
270	32	34	3	0	5815	95	76	7197.25	302.75	218.10	0.030	0.115	0.122
271	32	104	3	0	5835	67	67	5233.75	216.25	145.57	0.028	0.149	0.161
272	32	234	3	1	5800	95	89	11269.50	-787.00	-876.28	-0.078	-0.288	-0.267
273	32	41	3	0	5827	65	56	5433.75	216.25	142.64	0.026	0.146	0.157
274	18	56	1	2	5920	60		4222.94	164.56	123.31	0.029	0.175	0.191
275	46	205	3	0	5875	97	97	5211.44	313.56	232.10	0.045	0.164	0.178
276	46	221	3	2	5890	65		4962.13	237.87	205.87	0.041	0.228	0.256
277	45	221	3	0	5787	192	138	3722.25	302.75	237.57	0.064	0.118	0.125

278	45	62	1	0	5833	97	94	2827.00	185.50	107.51	0.038	0.145	0.156
280	39	140	1	0	5899	61	61	3283.75	216.25	134.07	0.041	0.239	0.271
281	39	140	1	0	5906	90	84	3390.50	259.50	176.03	0.052	0.220	0.246
282	39	140	1	0	5896	191	31	3325.63	324.37	240.36	0.072	0.822	1.274
283	48	5	1	0	5833	97	57	3316.19	233.81	151.70	0.046	0.286	0.332
284	48	20	1	0	5850	90	89	2077.00	210.50	144.97	0.070	0.277	0.319
285	48	151	1	0	5876	191	190	2229.69	270.31	195.70	0.088	0.162	0.175
286	48	215	1	2	5815	66		1284.78	2.72	-18.16	-0.014	-0.078	-0.076
287	48	215	1	2	5815	66		1266.88	20.62	-0.13	-0.000	-0.001	-0.001
288	48	100	1	2	5820	65		3843.88	218.62	179.00	0.047	0.256	0.291
289	48	100	1	0	5827	65	65	4033.06	291.94	204.42	0.051	0.278	0.320
290	48	236	1	0	5815	66	63	1163.50	86.50	41.79	0.036	0.204	0.227
291	48	105	1	0	5819	66	65	1516.88	108.12	54.72	0.036	0.199	0.220
292	48	236	1	0	5819	65	65	1277.69	97.31	50.44	0.039	0.217	0.243
293	48	124	1	2	5849	62		3814.13	323.37	283.25	0.074	0.422	0.525
294	48	130	1	0	5854	62	56	4397.94	227.06	134.10	0.030	0.196	0.216
295	49	224	1	2	5987	97		2799.63	-662.13	-696.31	-0.249	-0.836	-0.659
296	49	132	4	4	5986	66	25	21476.25	-1488.75	-1626.25	-0.076	-0.280	-0.261
297	49	44	3	0	5939	96	96	3515.50	272.00	215.58	0.061	0.226	0.254
298	67	67	1	2	5902	191		939.50	-277.00	-295.12	-0.314	-0.522	-0.514
299	67	221	3	0	5794	185	185	3782.38	317.62	252.97	0.067	0.128	0.136
300	67	33	3	0	5779	193	189	2440.50	259.50	213.66	0.088	0.159	0.172
301	67	33	3	0	5856	95	95	2505.38	194.62	148.65	0.059	0.221	0.248
302	67	221	1	0	5857	90	90	2312.81	162.19	92.96	0.040	0.160	0.173
303	67	242	1	2	5695	193		768.56	-56.06	-71.94	-0.094	-0.169	-0.170
304	67	242	1	2	5695	194		768.56	-56.06	-71.94	-0.094	-0.168	-0.169
305	67	221	1	0	5721	91	91	1898.63	138.87	78.53	0.041	0.163	0.177
306	67	33	3	0	5612	194	193	2437.13	200.37	156.22	0.064	0.117	0.124
307	67	33	3	0	5612	194	193	2437.13	200.37	156.22	0.064	0.117	0.124
308	63	39	1	0	5895	191	191	4372.56	464.94	370.79	0.085	0.156	0.168
309	63	127	1	0	6001	91	91	3187.13	237.87	159.44	0.050	0.196	0.216
310	63	14	1	0	5905	194	68	2412.13	237.87	166.02	0.069	0.357	0.429
311	63	198	1	2	5987	90		3360.44	-247.94	-284.88	-0.085	-0.330	-0.302
312	63	228	1	0	6003	60	60	2225.31	162.19	93.13	0.042	0.249	0.283
313	63	3	1	2	5890	65		8404.00	-216.50	-264.25	-0.031	-0.174	-0.164

314	63	64	1	0	5890	65	65	4246.25	216.25	126.15	0.030	0.164	0.179
315	63	155	1	0	5909	65	46	7567.50	432.50	331.11	0.044	0.340	0.405
316	63	104	1	2	5913	60		2827.00	-2.00	-36.00	-0.013	-0.077	-0.075
317	63	64	1	2	5923	60		4608.06	-258.06	-301.56	-0.065	-0.386	-0.337
318	63	32	1	0	5890	96	93	5605.69	356.81	259.26	0.046	0.177	0.194
319	68	208	1	0	5856	193	193	2593.88	281.12	208.35	0.080	0.146	0.157
320	68	59	3	0	5898	95	56	7535.75	389.25	304.82	0.040	0.152	0.165
321	68	169	3	1	5806	191	191	4367.50	-137.50	-196.25	-0.045	-0.084	-0.084
322	68	207	2	2	5814	193		1959.44	140.56	140.56	0.072	0.131	0.140
323	68	207	2	1	5905	95	95	2500.66	24.34	-7.28	-0.003	-0.011	-0.011
324	68	207	2	1	5905	95	95	2500.66	24.34	-7.28	-0.003	-0.011	-0.011
325	68	169	3	1	5905	95	95	4908.06	-718.06	-777.81	-0.158	-0.565	-0.485
326	68	169	3	1	5905	95	95	4908.06	-718.06	-777.81	-0.158	-0.565	-0.485
327	68	178	2	1	5598	192	192	6083.38	176.62	131.41	0.022	0.041	0.041
328	68	91	1	0	5601	246	240	5302.63	497.37	401.02	0.076	0.111	0.117
329	68	169	1	2	5632	193		2659.75	-372.25	-406.06	-0.153	-0.269	-0.269
330	68	78	1	2	5660	193		2155.69	144.31	112.75	0.052	0.096	0.101
331	68	78	1	2	5660	193		2155.69	144.31	112.75	0.052	0.096	0.101
332	68	177	2	1	5744	193	188	5870.88	-485.88	-530.22	-0.090	-0.168	-0.168
333	68	228	2	2	5752	192		1607.75	129.75	129.75	0.081	0.148	0.159
334	68	169	2	2	5766	192		1909.44	140.56	140.56	0.074	0.135	0.145
335	68	169	2	2	5766	192		1909.44	140.56	140.56	0.074	0.135	0.145
336	68	228	2	2	5776	192		1491.88	108.12	108.12	0.072	0.133	0.142
337	68	139	2	1	5700	90	90	3020.25	-315.25	-347.62	-0.115	-0.442	-0.391
338	68	207	2	2	5828	95		2266.88	108.12	108.12	0.048	0.179	0.196
339	68	203	3	0	5892	95	60	4662.13	237.87	167.22	0.036	0.135	0.145
340	68	203	3	0	5892	95	95	4662.13	237.87	166.28	0.036	0.135	0.144
341	68	152	1	0	5749	65	65	7354.69	270.31	169.87	0.023	0.128	0.137
342	68	154	1	0	5749	65	65	12474.25	475.75	362.56	0.029	0.161	0.175
343	68	177	2	1	5752	66	21	5919.56	-707.06	-751.27	-0.127	-2.077	-0.905
344	68	59	2	1	5762	65	60	3741.88	-127.88	-164.25	-0.044	-0.261	-0.239
345	68	59	2	1	5762	65	65	3741.88	-127.88	-164.25	-0.044	-0.241	-0.223
346	68	178	2	2	5773	67		5689.50	173.00	173.00	0.030	0.163	0.177
347	68	178	2	2	5773	67		5689.50	173.00	173.00	0.030	0.163	0.177
348	68	37	2	2	5780	67		3177.69	97.31	97.31	0.031	0.164	0.179

349	68	37	1	0	5828	67	67	3306.06	118.94	39.70	0.012	0.065	0.067
350	68	178	1	0	5828	67	67	6721.25	216.25	116.60	0.017	0.094	0.098
351	68	59	3	3	5898	67	57	7589.81	160.19	38.03	0.005	0.032	0.033
352	68	153	3	0	5892	192	180	8760.69	789.31	695.84	0.079	0.145	0.156
353	74	147	1	0	5867	95	95	1936.13	151.37	89.88	0.046	0.174	0.190
354	74	10	1	0	5888	95	95	2282.41	167.59	99.03	0.043	0.163	0.177
355	74	10	1	0	5888	95	95	2282.41	167.59	99.03	0.043	0.163	0.177
356	74	173	3	1	5920	66	66	8025.63	-100.63	-179.25	-0.022	-0.122	-0.117
357	79	32	1	2	6007	65		6043.88	-593.88	-639.20	-0.106	-0.565	-0.466
358	79	26	1	2	5987	90		5334.75	-109.75	-154.39	-0.029	-0.116	-0.112
359	79	120	1	2	5983	95		2491.19	-328.69	-361.06	-0.145	-0.520	-0.452
360	79	161	1	2	6007	65		8635.75	226.75	178.72	0.021	0.115	0.122
361	79	168	1	0	6008	62	62	6610.75	389.25	289.10	0.044	0.252	0.287
362	79	174	1	2	5952	90		5050.63	-188.13	-232.50	-0.046	-0.183	-0.174
363	79	104	1	0	5912	32	32	2809.44	140.56	67.21	0.024	0.270	0.310
364	79	155	1	0	5899	60	60	7565.81	321.69	219.99	0.029	0.174	0.190
365	79	200	1	0	5896	65	59	5440.50	259.50	163.75	0.030	0.183	0.201
366	79	32	1	0	5890	96	96	5593.19	356.81	259.45	0.046	0.172	0.188
367	79	155	1	2	5959	62		7967.50	232.50	185.10	0.023	0.135	0.145
368	83	137	3	1	5976	95	95	5000.63	-0.63	-64.44	-0.013	-0.049	-0.049
369	83	131	3	1	5960	96	96	6189.13	-39.13	-109.00	-0.018	-0.066	-0.065
370	83	204	3	1	5966	62	62	9817.50	-993.50	-1078.50	-0.110	-0.614	-0.496
371	83	136	2	2	5902	30		4802.00	173.00	173.00	0.036	0.431	0.538
372	83	137	3	0	5917	65	56	3908.75	216.25	150.23	0.038	0.212	0.236
373	83	105	3	1	5895	95	95	3351.31	-201.31	-249.06	-0.074	-0.275	-0.257
374	83	48	1	0	5903	97	94	6758.38	454.12	354.83	0.053	0.199	0.220
375	83	130	2	1	5906	95	95	5568.88	306.12	261.27	0.047	0.176	0.193
376	84	226	3	0	5898	194	194	23393.00	1557.00	1443.10	0.062	0.113	0.119
377	84	118	3	0	5898	194	169	16575.50	1124.50	1020.05	0.062	0.112	0.119
378	84	72	3	0	5898	194	194	12760.00	865.00	766.16	0.060	0.110	0.116
379	84	152	3	0	5856	193	179	14962.00	1038.00	936.03	0.063	0.115	0.122
380	84	168	3	0	5856	193	189	11346.50	778.50	679.46	0.060	0.110	0.116
381	84	240	3	0	5856	193	190	19210.63	1189.37	1075.63	0.056	0.103	0.109
382	84	104	3	1	5842	214	214	5054.00	197.00	132.56	0.026	0.044	0.045
383	84	104	3	1	5842	214	214	5054.00	197.00	132.56	0.026	0.044	0.045

384	84	3	3	1	5854	191	191	17714.00	376.00	279.54	0.016	0.030	0.030
385	84	132	1	0	5854	191	188	5749.25	475.75	378.25	0.066	0.124	0.132
386	84	116	3	0	5850	192	192	8766.13	583.87	489.73	0.056	0.103	0.109
387	84	130	5	5	5847	191	184	12869.44	1005.56	819.88	0.064	0.123	0.130
388	84	18	1	0	5836	192	192	9609.38	540.62	431.92	0.045	0.084	0.087
389	84	18	1	0	5836	192	192	9609.38	540.62	431.92	0.045	0.084	0.087
390	84	100	1	2	5827	194		3892.50	145.00	104.37	0.027	0.050	0.051
391	84	100	3	0	5827	194	132	7914.75	760.25	669.29	0.085	0.153	0.165
392	84	216	3	0	5910	97	94	18924.19	863.31	756.55	0.040	0.148	0.159
393	84	25	2	2	5961	32		5175.63	324.37	324.37	0.063	0.693	1.000
394	84	18	1	0	5870	95	62	10941.50	346.00	236.05	0.022	0.126	0.134
395	84	18	1	0	5870	95	70	10941.50	346.00	235.14	0.021	0.111	0.117
396	84	57	3	0	5856	95	95	6265.50	259.50	181.88	0.029	0.110	0.116
397	84	18	3	0	5832	95	88	18713.44	449.06	341.69	0.018	0.070	0.072
398	84	59	3	0	5836	66	66	7197.25	302.75	220.40	0.031	0.167	0.182
399	86	2	1	2	5939	127		1780.38	32.12	5.37	0.003	0.009	0.009
400	23	60	3	1	5990	95	95	6679.00	-619.00	-689.56	-0.103	-0.378	-0.342
401	23	54	3	2	5990	95		6004.00	346.00	311.12	0.052	0.194	0.214
402	34	194	1	0	6032	60	41	5225.63	324.37	228.13	0.044	0.380	0.463
403	23	102	3	0	5988	90	90	8410.75	389.25	300.34	0.036	0.142	0.153
404	5	104	3	1	5888	191	191	5329.00	-153.00	-217.94	-0.041	-0.077	-0.077
405	5	79	1	2	5876	191		2656.38	156.12	122.44	0.046	0.086	0.090
406	50	32	1	2	6014	65		5793.88	206.12	161.05	0.028	0.154	0.166
407	50	228	1	0	6003	60	60	2225.31	162.19	93.13	0.042	0.249	0.283
408	50	16	3	1	6001	65	65	14594.50	-1044.50	-1136.82	-0.078	-0.421	-0.366
409	21	15	1	0	5806	191	191	1696.25	178.75	123.64	0.073	0.134	0.144
410	58	195	1	0	5863	193	193	7685.00	915.00	810.73	0.105	0.190	0.209
411	28	212	3	1	5826	192	191	3315.50	222.00	172.50	0.052	0.096	0.101
412	21	40	1	0	5814	193	186	1489.50	173.00	119.87	0.080	0.152	0.164
413	59	221	1	0	5793	193	193	1889.50	173.00	107.79	0.057	0.105	0.111
414	76	165	3	0	5786	193	193	2758.75	216.25	155.44	0.056	0.104	0.109
415	64	221	3	0	5786	193	167	3772.25	302.75	237.93	0.063	0.116	0.123
416	78	128	1	0	5882	97	83	2819.56	205.44	128.26	0.045	0.196	0.216
417	78	128	1	0	5882	97	97	2819.56	205.44	128.06	0.045	0.167	0.182
418	81	221	1	0	5787	192	192	1797.94	227.06	162.91	0.091	0.165	0.179

419	78	142	3	0	5856	120	120	11237.75	562.25	464.27	0.041	0.123	0.131
420	81	14	1	0	5806	191	168	2271.25	228.75	157.44	0.069	0.146	0.157
421	7	238	1	2	5780	192		4316.50	121.00	78.69	0.018	0.034	0.035
422	60	104	3	0	5874	95	95	5172.94	227.06	156.17	0.030	0.114	0.121
423	46	205	1	0	5876	92	92	2474.63	237.87	157.07	0.063	0.244	0.277
424	59	69	1	0	5776	192	192	3155.69	356.81	272.27	0.086	0.157	0.170
425	76	70	3	0	5842	67	67	10317.50	432.50	337.48	0.033	0.175	0.192
426	60	218	3	0	5853	95	95	6308.06	291.94	212.78	0.034	0.127	0.136
427	64	35	1	0	5818	192	137	1228.69	183.81	128.94	0.105	0.266	0.305
428	56	130	3	0	5832	66	63	8772.25	302.75	210.83	0.024	0.131	0.140
429	56	130	3	0	5832	66	66	8772.25	302.75	210.78	0.024	0.131	0.140
430	52	171	3	0	5825	65	50	3712.81	162.19	105.14	0.028	0.157	0.170
431	8	119	1	0	5638	194	194	5227.63	497.37	400.78	0.077	0.139	0.149
432	42	221	1	0	5671	196	189	1801.31	248.69	184.69	0.103	0.189	0.207
433	5	41	3	1	5903	65	65	6904.69	-154.69	-227.38	-0.033	-0.182	-0.171
434	23	2	3	1	5988	96	96	3751.31	-246.31	-297.69	-0.079	-0.290	-0.270
435	23	100	3	1	5988	96	96	8781.00	-1881.00	-1959.50	-0.223	-0.766	-0.617
436	89	113	1	0	5926	95	95	3058.75	216.25	138.57	0.045	0.170	0.186
437	89	77	2	1	5955	95	95	2223.63	-301.13	-327.25	-0.147	-0.528	-0.458
441	49	114	1	2	6007	91		3699.63	62.87	24.19	0.007	0.026	0.026
442	50	39	1	0	6006	92	92	5207.38	367.62	271.95	0.052	0.202	0.224
443	10	220	3	0	6001	97	97	5850.63	324.37	251.88	0.043	0.159	0.172
444	63	161	1	2	5980	90		8990.44	-77.94	-126.59	-0.014	-0.057	-0.056
445	83	83	3	0	5917	97	97	3287.13	237.87	183.62	0.056	0.205	0.227
446	83	128	3	1	5917	97	97	6082.38	381.62	311.37	0.051	0.188	0.207
450	29	222	1	2	5944	193		1167.88	-180.38	-201.00	-0.172	-0.300	-0.300
451	45	233	2	1	5932	194	194	1537.81	-37.81	-59.31	-0.039	-0.071	-0.071
452	45	233	2	1	5932	194	194	1537.81	-37.81	-59.31	-0.039	-0.071	-0.071
453	45	233	2	1	5932	194	194	1537.81	-37.81	-59.31	-0.039	-0.071	-0.071
454	21	40	1	2	5931	195		1862.13	265.37	237.37	0.127	0.225	0.252
455	29	222	1	2	5926	194		1244.56	-294.56	-316.06	-0.254	-0.426	-0.424
456	45	155	2	1	5918	194	194	7447.88	-89.88	-136.20	-0.018	-0.034	-0.034
457	29	192	3	0	5912	194	194	2090.50	259.50	216.71	0.104	0.186	0.204
458	29	192	3	0	5912	194	194	2090.50	259.50	216.71	0.104	0.186	0.204
459	29	192	3	2	5912	194		2090.50	259.50	240.75	0.115	0.205	0.228

460	29	192	3	2	5912	194		2090.50	259.50	240.75	0.115	0.205	0.228
461	29	192	3	2	5912	194		2090.50	259.50	240.75	0.115	0.205	0.228
462	29	222	1	2	5912	194		939.50	35.50	17.37	0.018	0.034	0.035
463	29	144	3	0	5909	196	196	4224.25	475.75	408.07	0.097	0.172	0.187
464	29	144	3	0	5909	196	196	4224.25	475.75	408.07	0.097	0.172	0.187
465	29	144	3	2	5910	195		4724.25	500.75	468.75	0.099	0.177	0.194
466	18	107	3	1	5905	192	192	2690.50	-25.50	-67.38	-0.025	-0.047	-0.047
467	45	160	1	2	5905	192		3064.81	-152.31	-188.31	-0.061	-0.113	-0.114
468	82	30	3	1	6002	94	94	7469.50	-869.50	-944.19	-0.126	-0.462	-0.408
469	53	226	1	0	5899	203	203	11610.00	865.00	751.13	0.065	0.113	0.119
470	45	173	3	1	5898	204	204	7937.75	-887.75	-964.38	-0.121	-0.205	-0.207
471	45	233	3	1	5898	204	204	2643.88	31.12	-10.63	-0.004	-0.007	-0.007
472	4	120	3	1	5945	195	195	5239.13	-1546.63	-1604.87	-0.306	-0.500	-0.496
473	4	120	1	2	5945	195		2533.06	-680.56	-713.69	-0.282	-0.465	-0.462
474	4	2	1	2	5946	194		1687.13	-57.13	-83.38	-0.049	-0.091	-0.091
475	13	190	3	0	6063	95	95	3958.75	216.25	152.14	0.038	0.145	0.156
476	13	112	3	0	5944	193	176	4507.38	367.62	299.80	0.067	0.122	0.130
477	13	28	1	2	6058	90		2455.38	-240.38	-272.63	-0.111	-0.427	-0.380
478	13	28	1	2	6058	90		2455.38	-240.38	-272.63	-0.111	-0.427	-0.380
479	16	219	1	2	6080	60		13522.88	-3622.88	-3676.02	-0.272	-1.463	-0.855
480	16	219	1	2	6078	65		13501.25	-3351.25	-3404.40	-0.252	-1.263	-0.804
481	16	149	1	2	5959	195		3241.50	-516.50	-553.44	-0.171	-0.295	-0.296
482	16	104	1	2	5904	194		2538.81	-0.81	-33.75	-0.013	-0.025	-0.025
483	16	28	3	0	5924	195	146	3589.13	410.87	347.10	0.097	0.173	0.189
484	16	149	3	1	6056	60	60	6929.00	-354.00	-426.50	-0.062	-0.363	-0.321
485	30	133	1	2	5930	196		3935.06	64.94	23.94	0.006	0.011	0.011
486	30	210	1	2	5918	194		4214.13	3.37	-38.75	-0.009	-0.017	-0.017
487	30	239	3	0	5912	194	173	8172.88	664.62	574.23	0.070	0.128	0.136
488	30	70	3	1	5913	194	194	9921.50	278.50	190.15	0.019	0.036	0.036
489	30	201	3	0	5909	196	196	4079.00	346.00	279.43	0.069	0.123	0.131
490	45	196	2	1	5931	195	195	2733.75	-333.75	-364.75	-0.133	-0.234	-0.235
491	45	196	2	1	5931	195	195	2733.75	-333.75	-364.75	-0.133	-0.234	-0.235
493	49	132	4	4	6000	95	95	21186.38	-385.88	-524.00	-0.025	-0.094	-0.092
494	49	132	1	0	6021	91	91	6026.63	410.87	313.34	0.052	0.203	0.225
495	83	130	3	1	6015	97	97	6282.38	-1151.38	-1218.81	-0.194	-0.667	-0.556

496	83	83	3	0	5918	194	194	3107.38	430.12	372.39	0.120	0.213	0.237
497	83	30	1	2	5911	194		3242.50	70.00	32.62	0.010	0.019	0.019
498	83	30	1	2	5911	194		3242.50	70.00	32.62	0.010	0.019	0.019
499	5	149	1	0	6043	90	90	3171.25	216.25	138.14	0.044	0.173	0.189
500	41	141	1	0	6089	48	48	5490.50	259.50	162.91	0.030	0.222	0.249
501	33	57	1	2	6047	93		4687.13	75.87	32.25	0.007	0.027	0.027
502	43	61	1	2	6051	91		5582.38	-17.38	-62.33	-0.011	-0.045	-0.044
503	33	45	1	0	6078	65	65	6338.13	324.37	226.23	0.036	0.197	0.218
504	62	163	1	2	6094	32		5271.25	-221.25	-265.74	-0.050	-0.561	-0.446
505	70	68	1	0	6084	60	60	3164.50	173.00	93.45	0.030	0.177	0.194
506	57	38	1	0	6088	60	52	7769.19	443.31	339.66	0.044	0.300	0.350
507	40	100	3	1	6053	95	34	8142.50	-2092.50	-2168.94	-0.266	-0.907	-0.696
508	9	162	3	1	6065	96	96	14316.13	-96.13	-188.63	-0.013	-0.050	-0.049
509	9	125	2	2	6081	91		4947.25	302.75	302.75	0.061	0.238	0.269
510	9	77	3	2	6078	91		3808.75	229.25	202.12	0.053	0.207	0.230
511	9	51	3	1	5968	194	194	5424.25	-49.25	-115.19	-0.021	-0.040	-0.040
512	9	9	1	2	5972	191		2017.19	107.81	77.94	0.039	0.072	0.075
513	9	9	3	1	5965	196	196	3932.38	292.62	236.75	0.060	0.109	0.115
514	9	51	1	2	5932	194		2509.75	-109.75	-142.81	-0.057	-0.104	-0.104
515	9	9	1	2	5930	196		1979.69	245.31	215.81	0.109	0.193	0.213
516	9	9	2	1	6021	91	87	2309.44	-321.94	-348.56	-0.151	-0.590	-0.497
517	84	216	1	0	5975	194	194	9518.13	756.87	649.65	0.068	0.124	0.132
518	4	28	1	0	5966	195	195	1822.94	202.06	137.79	0.076	0.136	0.146
519	63	12	1	2	6086	90		4097.25	-374.25	-415.25	-0.101	-0.392	-0.352
520	86	28	3	0	5968	194	194	3629.00	346.00	282.89	0.078	0.141	0.152
521	22	28	1	2	6071	92		2428.69	36.31	4.25	0.002	0.007	0.007
522	3	250	3	0	6071	97	97	6718.19	356.81	272.96	0.041	0.150	0.162
523	75	251	1	2	6088	66		4299.63	337.87	296.19	0.069	0.368	0.445
524	54	213	3	1	6067	95	95	6679.00	21.00	-51.19	-0.008	-0.029	-0.029
525	62	163	3	1	6067	95	95	10374.25	-99.25	-187.76	-0.018	-0.069	-0.068
526	46	234	1	2	5903	191		4909.38	-1079.38	-1123.82	-0.229	-0.394	-0.392
527	83	138	3	1	5899	193	193	8721.50	-2171.50	-2249.87	-0.258	-0.434	-0.431
528	74	56	1	0	5899	193	193	3914.13	410.87	319.88	0.082	0.149	0.160
530	10	94	1	0	5979	196	185	8022.88	627.12	521.07	0.065	0.124	0.132
531	10	216	1	0	5975	194	194	9468.13	756.87	649.70	0.069	0.125	0.133

532	13	14	1	0	5905	192	70	2412.13	237.87	163.93	0.068	0.343	0.409
534	13	189	6	2	5925	194		4479.00	421.00	389.94	0.087	0.157	0.170
537	9	253	2	1	6100	61	61	4909.44	-21.94	-65.38	-0.013	-0.079	-0.077
539	9	169	3	1	6015	97	97	3740.50	99.50	46.50	0.012	0.046	0.048
540	9	158	3	1	6010	95	95	7657.38	72.62	-4.56	-0.001	-0.002	-0.002
541	68	159	3	0	6109	65	48	10579.00	346.00	250.80	0.024	0.132	0.141
542	40	12	3	1	6077	95	95	8295.88	-724.88	-803.56	-0.097	-0.355	-0.324
543	16	219	1	2	6107	65		11229.63	-329.63	-380.53	-0.034	-0.187	-0.176
544	49	38	1	0	6116	35	35	8410.75	389.25	285.04	0.034	0.348	0.416
545	81	12	1	2	6107	61		4029.69	-206.69	-247.19	-0.061	-0.356	-0.315
547	1	51	1	2	5944	193		2645.56	-58.06	-91.75	-0.035	-0.064	-0.065
548	1	77	1	2	5939	194		1888.81	-29.31	-57.69	-0.031	-0.057	-0.057
549	1	77	3	1	5952	195	195	4070.88	-99.88	-156.13	-0.038	-0.070	-0.071
550	3	69	3	0	6044	96	93	6754.00	346.00	266.40	0.039	0.147	0.158
551	3	28	3	1	6067	87	87	4922.25	-254.75	-317.06	-0.064	-0.262	-0.244
552	3	120	3	1	5924	195	178	5020.88	-940.88	-1000.56	-0.199	-0.340	-0.340
553	3	28	3	0	6017	90	90	3940.50	284.50	221.06	0.056	0.221	0.248
554	3	69	1	2	5919	194		3182.38	190.12	153.37	0.048	0.089	0.093
555	3	85	1	2	5912	194		3367.50	-367.50	-405.50	-0.120	-0.214	-0.214
556	16	84	3	1	5920	194	194	6264.75	395.25	323.25	0.052	0.095	0.099
557	16	28	3	0	6017	90	90	3965.50	272.00	208.43	0.053	0.208	0.231
558	16	31	3	1	5910	195	195	3018.88	-193.88	-238.50	-0.079	-0.142	-0.143
559	83	29	3	1	5937	196	196	4456.00	-1656.00	-1708.44	-0.383	-0.604	-0.594
560	83	28	3	1	6067	52	52	4929.69	-449.69	-511.19	-0.104	-0.693	-0.536
561	83	58	1	2	5919	194		4149.25	-886.75	-928.87	-0.224	-0.380	-0.379
562	83	82	3	1	5918	194	194	6351.25	-3951.25	-4006.75	-0.631	-0.920	-0.847
563	83	130	3	1	6015	97	97	10334.38	315.62	226.89	0.022	0.082	0.085
564	83	131	3	1	5916	196	37	7408.00	-2033.00	-2104.75	-0.284	-0.466	-0.463
565	84	237	3	2	5925	194		14787.69	1037.31	990.44	0.067	0.122	0.130
566	84	81	3	1	5916	196	165	21393.00	-1723.00	-1822.03	-0.085	-0.152	-0.153
569	5	149	1	2	6056	60		3442.88	-117.88	-155.06	-0.045	-0.268	-0.244
570	5	149	1	2	6056	60		3442.88	-117.88	-155.06	-0.045	-0.268	-0.244
571	72	56	1	0	6058	61	61	4576.31	248.69	154.91	0.034	0.199	0.220
572	9	34	1	2	5920	194		4341.50	-159.00	-201.44	-0.046	-0.085	-0.086
575	9	51	1	2	6000	95		2646.25	-146.25	-179.56	-0.068	-0.252	-0.237

576	3	138	1	2	6018	98		4012.13	-775.13	-815.37	-0.203	-0.689	-0.571
577	4	149	1	0	5938	195	192	2766.50	546.00	469.27	0.170	0.298	0.347
578	4	151	3	0	5952	195	183	6162.75	562.25	484.81	0.079	0.142	0.152
579	4	211	3	1	5961	165	165	7283.00	42.00	-34.25	-0.005	-0.010	-0.010
580	4	41	3	1	6052	67	67	6090.50	84.50	15.31	0.003	0.014	0.014
581	4	106	1	0	5932	194	148	5852.63	747.37	648.14	0.111	0.259	0.296
582	4	114	2	2	5933	200		3410.09	264.91	264.91	0.078	0.137	0.146
583	4	114	2	2	5933	200		3410.09	264.91	264.91	0.078	0.137	0.146
584	4	24	3	1	5944	193	193	8497.88	517.12	434.12	0.051	0.094	0.099
585	4	104	3	1	5946	194	184	5785.75	-609.75	-675.87	-0.117	-0.208	-0.208
586	4	232	3	1	6060	90	90	16961.38	-1561.38	-1655.91	-0.098	-0.378	-0.341
587	4	85	1	2	5946	194		3355.00	-195.00	-232.94	-0.069	-0.126	-0.127
588	4	104	3	1	5948	193	180	5835.75	-697.25	-763.44	-0.131	-0.233	-0.233
589	10	217	3	0	6044	65	33	9675.63	324.37	229.15	0.024	0.131	0.140
590	10	252	3	0	6114	64	61	23016.09	783.91	671.53	0.029	0.164	0.178
591	10	217	3	2	6044	65		9675.63	364.37	320.37	0.033	0.183	0.201
592	10	188	1	0	6036	92	50	12764.75	735.25	619.55	0.049	0.346	0.413
593	10	197	3	1	6037	65	65	12242.50	-52.50	-142.89	-0.012	-0.065	-0.064
595	10	206	1	2	5938	195		4329.00	181.00	138.62	0.032	0.059	0.061
596	10	185	1	2	5909	196		6043.50	306.50	260.94	0.043	0.079	0.082
597	13	50	1	2	5983	194		3839.13	275.87	235.62	0.061	0.112	0.119
598	13	163	3	0	6030	96	96	9021.56	378.44	286.00	0.032	0.119	0.126
599	13	134	3	1	6052	67	67	4590.50	129.50	67.87	0.015	0.080	0.083
600	9	77	3	1	6035	65	65	3955.38	-4.38	-58.75	-0.015	-0.083	-0.081
601	20	197	1	2	5954	193		5432.00	-42.00	-87.04	-0.016	-0.030	-0.030
602	16	151	3	0	5948	193	185	6087.75	562.25	484.52	0.080	0.145	0.156
603	20	219	1	2	6044	96		13435.00	-3535.00	-3588.30	-0.267	-0.900	-0.693
604	49	114	4	2	5933	200		10246.50	936.50	899.12	0.088	0.154	0.166
605	49	85	3	1	5947	193	193	7289.75	-869.75	-943.56	-0.129	-0.230	-0.231
606	49	132	3	1	5947	193	193	13020.13	154.87	63.44	0.005	0.009	0.009
607	49	36	2	1	6052	95	85	4915.50	-138.00	-180.69	-0.037	-0.155	-0.149
608	49	232	1	2	6060	90		8419.19	-719.19	-767.05	-0.091	-0.354	-0.321
609	49	224	3	1	5932	194	194	7228.94	-3378.94	-3444.12	-0.476	-0.733	-0.704
610	61	232	1	0	5847	273	272	6870.50	692.00	591.25	0.086	0.111	0.117
611	63	11	1	2	6037	96		2994.56	-338.56	-373.56	-0.125	-0.447	-0.397

612	63	203	1	2	6018	90		2717.88	-116.88	-150.44	-0.055	-0.218	-0.206
615	68	181	2	1	6039	95	95	2077.00	-27.00	-54.50	-0.026	-0.100	-0.097
616	68	181	2	1	6039	95	95	2077.00	-27.00	-54.50	-0.026	-0.100	-0.097
617	68	181	2	1	6039	95	95	2077.00	-27.00	-54.50	-0.026	-0.100	-0.097
618	68	181	2	1	6039	95	95	2077.00	-27.00	-54.50	-0.026	-0.100	-0.097
619	68	181	2	1	6039	95	95	2077.00	-27.00	-54.50	-0.026	-0.100	-0.097
620	68	181	2	1	6039	95	95	2077.00	-27.00	-54.50	-0.026	-0.100	-0.097
621	68	181	2	1	6050	98	98	1952.00	-114.50	-139.88	-0.072	-0.258	-0.242
622	68	181	2	1	6050	98	98	1952.00	-114.50	-139.88	-0.072	-0.258	-0.242
623	68	181	2	1	6050	98	98	1952.00	-114.50	-139.88	-0.072	-0.258	-0.242
624	68	181	2	1	6050	98	98	1952.00	-114.50	-139.88	-0.072	-0.258	-0.242
625	68	181	2	1	6050	98	98	1952.00	-114.50	-139.88	-0.072	-0.258	-0.242
626	71	223	1	2	6092	62		4453.00	-410.50	-453.06	-0.102	-0.570	-0.468
627	68	178	3	0	6044	110	110	12387.75	562.25	464.39	0.037	0.122	0.130
628	68	159	3	0	6044	65	65	10182.38	367.62	272.68	0.027	0.148	0.160
629	79	161	1	2	6077	65		8717.50	-1167.50	-1215.65	-0.139	-0.733	-0.570
630	83	28	3	1	6067	95	95	4933.06	146.94	83.25	0.017	0.064	0.066
631	84	41	3	1	5939	194	132	6674.25	-399.25	-470.50	-0.070	-0.128	-0.128
632	84	203	3	1	5952	195	195	5676.94	-984.94	-1049.56	-0.185	-0.318	-0.318
633	84	104	3	1	5941	193	193	5621.56	-470.56	-536.25	-0.095	-0.172	-0.173
634	84	85	3	1	5941	193	193	5870.19	149.81	81.06	0.014	0.026	0.026
635	84	116	3	0	5944	193	193	12823.50	951.50	852.46	0.066	0.122	0.129
636	84	59	3	1	5944	193	193	6987.75	402.25	327.25	0.047	0.087	0.090
637	84	120	3	1	5945	195	195	5239.13	-1546.63	-1604.87	-0.306	-0.500	-0.496
638	84	189	3	1	5952	195	195	4389.13	110.87	50.87	0.012	0.022	0.022
639	84	197	1	2	5954	193		5419.50	-29.50	-74.53	-0.014	-0.026	-0.026
640	84	120	3	1	5959	195	195	5156.69	-1276.69	-1335.69	-0.259	-0.431	-0.429
641	84	237	2	2	5932	194		6175.38	1924.62	1924.62	0.312	0.510	0.666
642	84	100	3	1	6030	96	96	7974.94	-2199.94	-2273.31	-0.285	-0.954	-0.721
645	86	189	1	2	5940	193		2208.75	266.25	235.12	0.106	0.191	0.211
646	86	108	1	0	5945	195	190	5425.25	562.25	464.09	0.086	0.158	0.171
647	86	209	3	0	5944	193	193	6624.25	475.75	393.99	0.059	0.109	0.115
648	86	99	1	0	5939	194	194	5981.00	519.00	419.93	0.070	0.128	0.136
649	89	163	3	0	6030	96	96	9021.56	378.44	286.07	0.032	0.119	0.126
650	24	201	3	2	6073	95		5262.13	267.87	235.12	0.045	0.168	0.183

651	24	27	3	0	6093	65	65	5818.88	281.12	207.07	0.036	0.196	0.217
652	35	149	1	2	6059	90		3474.63	-699.63	-737.19	-0.212	-0.780	-0.620
653	6	100	3	1	6056	95	53	8142.50	-2392.50	-2467.25	-0.303	-1.017	-0.750
654	6	100	3	1	6056	95	93	8142.50	-2842.50	-2915.00	-0.358	-1.176	-0.818
655	40	12	3	1	6056	95	95	8695.88	-999.88	-1079.87	-0.124	-0.450	-0.399
656	40	12	3	1	6056	95	95	8695.88	-999.88	-1079.87	-0.124	-0.450	-0.399
657	72	232	1	2	6060	90		8387.44	-687.44	-735.22	-0.088	-0.341	-0.311
658	35	100	3	1	6056	95	95	8092.50	-2592.50	-2665.56	-0.329	-1.094	-0.785
659	40	100	3	1	6056	95	95	8092.50	-2592.50	-2665.56	-0.329	-1.094	-0.785
660	9	8	1	0	5973	195	174	8060.34	827.16	722.76	0.090	0.180	0.197
661	9	77	3	1	5958	193	193	4052.63	18.37	-38.50	-0.010	-0.018	-0.018
662	9	51	3	1	6056	95	52	5340.50	-340.50	-404.94	-0.076	-0.281	-0.261
663	9	172	1	0	6056	63	63	4082.38	367.62	279.75	0.069	0.384	0.468
664	9	206	1	2	5930	196		4198.25	249.25	207.31	0.049	0.090	0.094
665	9	164	3	0	6086	61	61	7047.25	327.75	245.17	0.035	0.205	0.227
666	9	96	3	1	5951	193	193	6474.25	-604.25	-674.00	-0.104	-0.187	-0.188
667	9	96	3	1	5944	193	193	5942.50	252.50	183.37	0.031	0.057	0.059
668	9	96	3	1	5945	195	195	6124.25	-54.25	-123.63	-0.020	-0.037	-0.037
669	9	92	1	0	5924	195	195	3719.88	367.62	280.35	0.075	0.136	0.146
670	9	59	3	1	5944	193	193	7012.75	27.25	-46.94	-0.007	-0.013	-0.013
671	9	51	1	2	5930	189		2543.88	-143.88	-177.00	-0.070	-0.130	-0.130
672	63	12	1	2	6107	61		4017.19	-181.69	-222.13	-0.055	-0.322	-0.288
673	51	235	1	2	6077	91		4832.38	-22.38	-66.58	-0.014	-0.055	-0.054
674	33	203	1	2	6070	81		2767.88	-292.88	-326.69	-0.118	-0.503	-0.432
675	57	11	3	1	6081	95	95	5147.25	189.75	124.81	0.024	0.092	0.096
676	35	39	1	0	6067	90	90	5035.75	389.25	294.19	0.058	0.230	0.259
677	57	153	3	1	6093	65	29	10695.88	-578.38	-666.26	-0.062	-0.339	-0.303
678	49	182	1	2	5976	194		5970.19	-345.19	-390.69	-0.065	-0.119	-0.120
679	9	89	3	0	6018	95	95	8317.50	432.50	340.92	0.041	0.154	0.167
680	18	104	1	2	5931	97		2639.50	17.00	-16.06	-0.006	-0.023	-0.023
681	18	85	1	2	5931	97		3278.00	239.50	202.81	0.062	0.226	0.253
682	46	223	1	2	5869	191		3683.38	291.62	251.94	0.068	0.126	0.135
683	46	223	1	2	5876	191		3808.38	379.12	338.81	0.089	0.163	0.177
684	46	205	3	0	5877	193	193	5006.00	519.00	437.13	0.087	0.158	0.172
685	46	205	1	0	5884	193	193	2459.75	302.75	221.49	0.090	0.163	0.177

686	46	184	1	0	5884	193	193	3404.00	346.00	262.03	0.077	0.140	0.151
687	45	88	2	1	6002	61	61	2102.00	-64.50	-91.88	-0.044	-0.256	-0.235
688	45	28	3	0	5793	193	193	2665.50	259.50	208.37	0.078	0.142	0.153
689	45	28	3	0	5793	193	193	2665.50	259.50	208.37	0.078	0.142	0.153
690	45	97	2	2	5906	95		4929.00	346.00	346.00	0.070	0.261	0.298
691	45	221	3	0	5819	192	192	3872.25	302.75	238.10	0.061	0.113	0.120
692	45	221	3	0	5819	192	192	3872.25	302.75	238.10	0.061	0.113	0.120
693	45	28	2	2	5819	192		1246.94	140.56	140.56	0.113	0.203	0.225
694	45	28	2	2	5819	192		1246.94	140.56	140.56	0.113	0.203	0.225
695	45	41	3	0	5856	193	193	5282.38	367.62	296.24	0.056	0.103	0.109
696	45	98	1	2	5876	191		4039.13	-426.63	-467.88	-0.116	-0.209	-0.210
697	45	151	1	0	5876	191	191	2246.25	216.25	141.75	0.063	0.117	0.124
698	45	169	1	2	5876	191		2157.06	-147.06	-177.69	-0.082	-0.151	-0.151
699	39	4	1	0	5890	191	191	5826.25	648.75	548.41	0.094	0.172	0.188
700	39	140	1	0	5890	191	191	3161.44	313.56	227.46	0.072	0.133	0.142
701	39	140	1	0	5890	191	191	3161.44	313.56	227.46	0.072	0.133	0.142
702	67	33	3	0	5833	192	192	2258.75	228.75	185.98	0.082	0.150	0.162
703	63	200	1	0	5925	65	65	5540.50	259.50	163.33	0.029	0.163	0.177
704	63	152	1	2	5933	67		8149.25	250.75	203.12	0.025	0.134	0.144
705	63	161	1	2	5951	65		8542.50	7.50	-40.48	-0.005	-0.027	-0.026
706	74	10	3	0	5868	97	97	3197.94	227.06	169.58	0.053	0.194	0.215
707	74	74	3	1	5909	91	91	6910.75	-285.75	-358.56	-0.052	-0.203	-0.192
708	27	203	3	1	5958	65	65	5936.44	-336.44	-404.06	-0.068	-0.370	-0.327
709	27	203	3	1	5958	65	65	5936.44	-336.44	-404.06	-0.068	-0.370	-0.327
710	27	176	3	0	5959	65	65	4083.75	216.25	152.70	0.037	0.206	0.229
711	27	176	3	1	5973	65	65	4629.69	-154.69	-215.31	-0.047	-0.255	-0.235
712	27	176	3	1	5973	65	65	4629.69	-154.69	-215.31	-0.047	-0.255	-0.235
713	27	176	3	1	5973	65	65	4462.13	-37.13	-97.00	-0.022	-0.121	-0.116
714	47	49	1	0	5884	193	193	2951.63	410.87	322.98	0.109	0.196	0.217
715	47	49	1	0	5884	193	193	2951.63	410.87	322.98	0.109	0.196	0.217
716	36	241	3	0	5982	90	90	4797.25	302.75	232.00	0.048	0.192	0.211
717	11	80	3	0	5874	191	191	3547.25	302.75	242.62	0.068	0.126	0.135
718	26	57	1	0	5974	89	89	3825.63	349.37	262.39	0.069	0.272	0.313
719	31	104	3	1	5870	193	193	5086.44	164.56	100.12	0.020	0.037	0.038
720	87	187	1	2	5864	192		4330.00	432.50	389.69	0.090	0.164	0.178

721	80	179	1	2	5860	191		16801.75	1808.25	1750.67	0.104	0.189	0.209
722	64	77	1	2	5955	95		2180.38	-245.38	-276.13	-0.127	-0.458	-0.406
723	77	171	1	2	5850	192		1607.06	220.44	195.31	0.122	0.218	0.244
724	14	73	1	2	5826	192		2137.13	135.37	104.62	0.049	0.091	0.095
725	14	73	1	2	5826	192		2137.13	135.37	104.62	0.049	0.091	0.095
726	14	73	1	2	5826	192		2137.13	135.37	104.62	0.049	0.091	0.095
727	25	42	3	0	5898	95	95	4733.75	216.25	147.70	0.031	0.118	0.125
728	74	165	1	0	5875	191	191	1762.13	237.87	172.21	0.098	0.178	0.195
729	28	212	3	2	5842	193		3268.88	281.12	256.37	0.078	0.143	0.153
730	56	39	3	0	5842	193	193	8824.88	800.12	706.13	0.080	0.146	0.157
731	56	104	3	1	5871	192	192	5061.44	89.56	25.44	0.005	0.010	0.010
732	56	120	3	1	5874	191	191	4832.38	-152.38	-214.38	-0.044	-0.083	-0.083
733	74	207	3	1	5913	95	95	4943.88	-68.88	-132.13	-0.027	-0.101	-0.099
734	74	167	1	2	5918	96		4358.06	291.94	249.69	0.057	0.212	0.236
735	28	33	1	0	5833	192	192	1107.75	129.75	86.98	0.079	0.144	0.155
736	28	33	1	0	5833	192	192	1107.75	129.75	86.98	0.079	0.144	0.155
737	87	145	1	0	5867	67	57	4024.63	275.37	185.74	0.046	0.289	0.335
738	81	204	1	0	5738	192	192	3209.75	302.75	214.98	0.067	0.123	0.131
739	37	186	2	2	5902	35		9939.13	410.87	410.87	0.041	0.422	0.526
740	8	191	1	2	5762	192		2559.75	-845.25	-878.56	-0.343	-0.561	-0.550
741	37	39	1	0	5875	21	21	3701.56	-189.06	-281.05	-0.076	-1.272	-0.747
742	37	39	1	0	5875	21	21	3701.56	-189.06	-281.05	-0.076	-1.272	-0.747
743	37	39	1	0	5875	21	21	3701.56	-189.06	-281.05	-0.076	-1.272	-0.747
744	37	39	1	0	5875	21	21	3701.56	-189.06	-281.05	-0.076	-1.272	-0.747
745	37	39	1	0	5875	21	21	3701.56	-189.06	-281.05	-0.076	-1.272	-0.747
746	37	39	1	0	5875	21	21	3701.56	-189.06	-281.05	-0.076	-1.272	-0.747
747	37	39	1	0	5875	21	21	3701.56	-189.06	-281.05	-0.076	-1.272	-0.747
748	37	39	1	0	5875	21	21	3701.56	-189.06	-281.05	-0.076	-1.272	-0.747
749	5	52	3	0	5876	65	65	8257.38	367.62	277.94	0.034	0.186	0.204
750	5	69	3	0	5875	65	65	6697.25	302.75	217.13	0.032	0.179	0.196
769	9	243	2	1	6150	61	61	3714.50	35.50	-2.25	-0.001	-0.004	-0.004
773	9	111	3	0	6163	65	65	4608.75	203.75	138.16	0.030	0.166	0.180
777	9	244	1	0	6142	90	90	4062.13	237.87	150.07	0.037	0.147	0.159
778	9	244	1	0	6142	90	90	4062.13	237.87	150.07	0.037	0.147	0.159
779	9	243	1	2	6141	90		3483.75	291.25	253.75	0.073	0.285	0.330

781	9	169	3	0	5997	224	224	3717.50	432.50	370.61	0.100	0.155	0.167
783	9	159	3	1	6126	95	95	10420.88	-570.88	-658.94	-0.063	-0.236	-0.222
784	9	202	3	0	6126	95	95	7532.38	367.62	284.14	0.038	0.142	0.153
785	9	76	1	0	6129	90	90	2268.22	156.78	88.28	0.039	0.155	0.167
786	9	169	1	0	6015	196	192	1797.94	227.06	164.89	0.092	0.167	0.182
787	9	169	1	0	6017	194	188	1772.94	227.06	164.75	0.093	0.173	0.188
791	9	149	1	2	6092	97		2565.50	209.50	176.37	0.069	0.250	0.284
794	9	163	1	0	6014	193	190	4156.69	468.31	374.42	0.090	0.166	0.180
795	9	163	1	0	6014	193	190	4156.69	468.31	374.42	0.090	0.166	0.180
796	9	245	3	0	6099	108	108	20962.00	1038.00	925.61	0.044	0.146	0.157
820	9	246	2	1	6170	30	27	3132.75	-470.25	-502.56	-0.160	-2.011	-0.906
821	9	246	2	1	6170	30	27	3132.75	-470.25	-502.56	-0.160	-2.011	-0.906
822	9	246	2	1	6170	30	23	3132.75	-445.25	-477.69	-0.152	-2.252	-0.928
860	3	11	2	2	6112	95		2466.19	183.81	183.81	0.075	0.276	0.318
861	10	11	2	2	6112	95		2466.19	183.81	183.81	0.075	0.276	0.318
862	10	216	1	0	6116	90	80	4806.38	281.12	186.91	0.039	0.174	0.190
863	24	203	1	2	6115	90		2252.00	135.50	104.37	0.046	0.184	0.202
864	54	3	3	1	6008	196	196	17352.50	647.50	551.17	0.032	0.058	0.060
865	16	219	1	0	6109	95	95	9985.00	865.00	755.07	0.076	0.280	0.323
866	54	75	3	0	6008	196	192	5945.88	454.12	374.12	0.063	0.114	0.120
867	30	12	1	2	6011	193		4270.19	-370.19	-413.19	-0.097	-0.175	-0.175
868	13	207	3	1	6008	196	196	4467.50	-567.50	-625.25	-0.140	-0.244	-0.245
869	10	188	2	2	6010	194		11342.44	832.56	832.56	0.073	0.133	0.143
870	3	108	1	0	6008	196	196	5799.25	625.75	527.38	0.091	0.162	0.176
871	50	135	1	2	6007	193		4481.00	-356.00	-400.00	-0.089	-0.162	-0.162
872	13	28	6	0	6007	193	189	3929.69	382.81	318.51	0.081	0.147	0.159
873	13	28	6	0	6007	193	193	3929.69	382.81	318.85	0.081	0.148	0.159
874	13	56	1	0	6007	193	193	3939.13	410.87	321.27	0.082	0.148	0.160
875	57	94	3	0	6105	95	91	19178.25	821.75	713.96	0.037	0.140	0.151
876	54	55	3	1	6004	193	193	5109.38	353.12	287.31	0.056	0.103	0.109
877	32	202	3	0	6102	95	95	7382.38	367.62	284.11	0.038	0.145	0.156
878	13	43	3	1	6001	195	195	3450.63	199.37	148.25	0.043	0.079	0.082
880	49	182	1	2	6002	194		5656.00	-168.50	-213.68	-0.038	-0.070	-0.070
881	49	182	1	2	6002	194		5656.00	-168.50	-213.68	-0.038	-0.070	-0.070
882	32	174	3	0	6100	96	93	10242.50	432.50	337.27	0.033	0.123	0.131

883	16	219	1	2	6100	96		12048.50	-123.50	-175.50	-0.015	-0.055	-0.054
884	13	43	3	1	6000	193	193	3500.63	149.37	98.00	0.028	0.052	0.054
885	32	21	2	1	6102	90	90	5178.69	-291.19	-334.62	-0.065	-0.254	-0.237
886	13	66	3	1	5997	195	195	2638.47	-413.47	-453.22	-0.172	-0.297	-0.297
887	13	66	3	1	5997	195	195	2638.47	-413.47	-453.22	-0.172	-0.297	-0.297
888	13	20	3	1	5997	193	193	4092.50	182.50	124.50	0.030	0.057	0.058
890	32	241	1	2	6095	95		2489.50	123.00	90.69	0.036	0.137	0.147
891	32	85	2	2	6095	95		2702.00	173.00	173.00	0.064	0.238	0.269
892	82	223	1	2	5997	193		4055.00	-55.00	-96.44	-0.024	-0.044	-0.044
893	32	81	1	0	5996	193	193	9767.44	832.56	724.39	0.074	0.135	0.145
894	82	30	1	2	5995	194		3485.06	-372.56	-411.31	-0.118	-0.210	-0.210
896	13	149	3	1	6084	95	95	6529.00	-679.00	-748.81	-0.115	-0.417	-0.374
897	23	199	1	2	5988	194		2222.25	302.75	271.12	0.122	0.217	0.242
898	13	189	3	1	6086	96	96	4740.50	259.50	196.50	0.041	0.154	0.167
899	33	57	1	0	6084	95	95	4506.38	281.12	187.00	0.041	0.156	0.169
900	50	32	1	2	6086	96		5479.00	-141.50	-186.33	-0.034	-0.127	-0.123
901	1	149	3	0	6086	96	89	6454.00	346.00	271.68	0.042	0.157	0.170
902	57	149	3	1	6084	95	95	6529.00	-679.00	-748.81	-0.115	-0.417	-0.374
903	57	85	3	0	6084	95	95	5804.00	346.00	269.18	0.046	0.174	0.190
911	57	204	3	1	6093	96	96	8007.38	-357.38	-435.44	-0.054	-0.201	-0.192
912	24	241	3	1	6093	96	96	5272.25	-122.25	-187.06	-0.035	-0.133	-0.128
913	13	130	1	0	5996	193	193	5375.94	486.56	390.33	0.073	0.133	0.142
914	13	66	3	1	5995	194	194	2740.50	-890.50	-928.75	-0.339	-0.549	-0.541
915	13	66	3	1	5995	194	194	2740.50	-890.50	-928.75	-0.339	-0.549	-0.541
916	13	100	6	1	5990	194	192	9223.56	-3133.56	-3210.44	-0.348	-0.562	-0.553
917	99	9	3	1	5980	204	204	4817.50	-792.50	-851.75	-0.177	-0.291	-0.294
918	86	12	1	2	5989	194		4775.25	-1000.25	-1044.59	-0.219	-0.372	-0.372
919	16	130	1	2	5989	194		5411.75	488.25	443.36	0.082	0.148	0.160
920	33	95	1	2	6093	90		3590.50	159.50	121.25	0.034	0.135	0.144
921	4	47	3	0	5988	194	194	6481.00	519.00	440.87	0.068	0.124	0.132
922	10	143	3	1	6115	96	96	8517.50	382.50	299.87	0.035	0.132	0.141
924	84	168	3	1	6045	194	194	14878.25	-728.25	-821.18	-0.055	-0.101	-0.101
925	84	85	3	1	6042	196	193	6319.50	-172.00	-242.56	-0.038	-0.070	-0.070
926	54	85	3	1	6042	196	193	6394.50	-209.50	-280.25	-0.044	-0.080	-0.080
927	13	85	3	1	6042	196	196	6519.50	-419.50	-490.56	-0.075	-0.135	-0.136

928	21	18	1	0	5952	286	286	11935.00	865.00	752.31	0.063	0.078	0.081
930	10	21	1	2	6044	194		4892.50	107.50	63.17	0.013	0.024	0.024
931	4	41	3	0	6044	194	194	5649.25	475.75	394.27	0.070	0.127	0.135
932	49	85	1	2	6042	196		3082.38	-32.38	-68.63	-0.022	-0.041	-0.041
933	3	85	3	1	6042	196	193	6444.50	-259.50	-330.38	-0.051	-0.093	-0.093
934	16	247	3	0	6141	97	97	3205.38	194.62	140.47	0.044	0.161	0.175
935	54	248	3	0	6141	97	83	11981.00	519.00	421.23	0.035	0.130	0.139
936	10	220	3	0	6142	96	96	6686.44	313.56	233.61	0.035	0.131	0.139
937	3	163	3	0	6140	95	81	8845.88	466.62	372.24	0.042	0.158	0.172
938	13	41	3	0	6030	204	204	5517.50	432.50	351.39	0.064	0.110	0.117
939	13	41	3	0	6030	204	204	5517.50	432.50	351.39	0.064	0.110	0.117
940	84	168	3	1	6037	194	191	15103.25	-1215.75	-1308.67	-0.087	-0.156	-0.157
941	84	38	3	0	6037	194	155	16306.63	843.37	739.22	0.045	0.083	0.087
943	10	21	3	1	6037	194	174	10516.13	-341.13	-429.43	-0.041	-0.075	-0.075
944	10	210	3	0	6037	194	194	8260.06	464.94	376.35	0.046	0.084	0.087
945	13	120	3	1	6024	203	203	4404.00	-779.00	-834.87	-0.190	-0.312	-0.315
946	10	120	3	1	6024	203	203	4404.00	-779.00	-834.87	-0.190	-0.312	-0.315
947	83	108	1	2	6140	87		6914.13	-376.63	-422.95	-0.061	-0.249	-0.233
948	10	21	1	2	6032	194		5324.94	-224.94	-269.66	-0.051	-0.093	-0.093
949	84	116	3	0	6022	203	202	11223.50	951.50	853.58	0.076	0.132	0.141
950	16	219	2	2	6130	95		10287.75	562.25	562.25	0.055	0.204	0.227
951	16	219	2	2	6130	95		10287.75	562.25	562.25	0.055	0.204	0.227
952	86	209	3	1	6133	95	95	7579.00	-604.00	-679.25	-0.090	-0.330	-0.303
953	84	100	3	1	6030	194	194	7661.38	-2536.38	-2608.12	-0.340	-0.551	-0.543
954	10	153	3	1	6128	96	96	9763.44	36.56	-51.06	-0.005	-0.020	-0.020
955	55	98	3	0	6128	96	96	5100.63	261.87	188.76	0.037	0.138	0.148
957	84	120	3	1	5997	224	224	4839.13	-1139.13	-1196.75	-0.247	-0.360	-0.371
958	62	63	3	1	5997	224	224	10195.13	579.87	490.92	0.048	0.077	0.080
959	54	65	3	0	6007	214	212	15116.00	1384.00	1276.91	0.084	0.138	0.148
960	82	120	3	1	5997	224	224	4789.13	-1064.13	-1121.75	-0.234	-0.343	-0.353
961	82	137	3	1	5997	224	224	4499.25	-449.25	-507.94	-0.113	-0.174	-0.177
962	51	134	3	2	6126	95		4787.13	237.87	206.31	0.043	0.162	0.176
963	51	134	3	2	6126	95		4787.13	237.87	206.31	0.043	0.162	0.176
964	32	202	3	2	6126	95		7532.38	367.62	328.87	0.044	0.164	0.178
965	30	120	3	1	6126	95	95	3994.56	-294.56	-348.06	-0.087	-0.321	-0.296

966	54	159	3	1	6126	95	95	10420.88	-470.88	-559.19	-0.054	-0.201	-0.191
968	49	132	1	0	6023	194	194	6022.56	464.94	366.56	0.061	0.111	0.118
969	57	21	1	2	6093	124		5191.50	-91.50	-136.04	-0.026	-0.076	-0.075
970	49	132	1	0	6023	194	194	6022.56	464.94	366.56	0.061	0.111	0.118
971	55	141	3	1	6122	95	95	12356.00	-56.00	-146.59	-0.012	-0.045	-0.045
972	4	28	1	0	6021	193	192	1837.13	250.37	187.31	0.102	0.185	0.203
973	5	249	1	0	6148	65	49	4662.13	237.87	144.13	0.031	0.227	0.255
975	83	12	1	2	6016	196		4401.67	-251.68	-295.30	-0.067	-0.121	-0.121
976	54	203	1	2	6016	196		2570.56	-220.56	-253.88	-0.099	-0.175	-0.176
977	32	11	1	2	6016	196		2608.06	304.44	270.94	0.104	0.184	0.202
979	83	204	1	2	6016	195		4192.50	-492.50	-534.63	-0.128	-0.225	-0.225
980	83	105	3	0	6016	195	195	2593.88	281.12	233.63	0.090	0.161	0.175
981	16	28	3	0	6016	195	195	3839.81	335.19	271.15	0.071	0.128	0.136
982	10	127	1	0	6018	193	189	2784.75	302.75	225.20	0.081	0.150	0.162
983	10	108	1	0	6015	196	196	5666.13	583.87	485.56	0.086	0.153	0.165
984	55	14	1	2	6170	65		3492.37	132.63	95.19	0.027	0.151	0.163
987	10	71	3	0	6169	65	65	8046.56	390.94	300.28	0.037	0.206	0.228
991	24	204	3	1	6161	65	65	7461.44	-836.44	-910.44	-0.122	-0.646	-0.518
1034	54	248	3	0	6156	65	65	12445.88	454.12	356.43	0.029	0.159	0.172

AVERAGE ØF INDIV. CØMPØUND INT. METHØD R.ØF R. = 0.022
STD.DEV.ØF R.ØF R., CØMPØUND INTEREST METHØD = 0.270
SKEWNESS ØF R. ØF R., CØMPØUND INTEREST METHØD = -0.862
AVERAGE ØF INDIV.MØD.CØMPØUND I. METH R.ØF R. = -0.011
STD.DEV.ØF R.ØF R., MØD. CØMPØUND INT. METHØD = 0.326
SKEWNESS ØF R.ØF R., MØD. CØMPØUND I. METHØD = -2.568
INV. AND DUR.WT.AVG.ØF CØMPØUND I.METH.R.ØF R. = 0.021
INV.AND DUR.WT.AVG.ØF MØD.CØMP.I.R.ØF R. = 0.001
DUR. WT. AVG.ØF CØMP.INT.METH.R.ØF R. = 0.024
DUR.WT.AVG. ØF MØD. CØMP.INT.METH.R.ØF R. = 0.006
AVERAGE RATE ØF ANNUAL RETURN = 0.001
THE AVERAGE RETURN PER CØNTRACT WRITTEN = 0.000
THE AVERAGE DØLLAR GAIN PER ØPTIØN CØNTRCT SØLD= -7.68
STD. DEV. ØF DØLLAR GAIN PER CØNTRACT = 621.73
SKEWNESS ØF DØLLAR GAIN PER CØNTRACT = -2.871
THE AVERAGE INVESTMENT PER CØNTRACT = 5971.18

NØ.ØF ØPTIØN CØNTRACTS CALCULATIØNS BASED ØN = 851
THE AVERAGE DURATIØN ØF AN ØPTIØN CØNTRACT = 126

APPENDIX 6

THE ØPPØRTUNITY CØST ØF THE ØPTIØN WRITER ARE CALCULATED WITH THIS PRØGRAM.

```
600 GAIN=0.
    SUMN=0.
    NC=0
549 IC=NC
    PGAIN=GAIN
    NDA2=0.
    READ 1, NC,PR,NTR,NSK,NTE,NTY,ØPR,PRM,NB,NE,NA,NDA,PAT,DIV,INØ,NCC
    TRM=PRM
    IF(PRM)300,2,301
300 PRM=-PRM
301 IF(NCC)2,76,71
 71 READ 1345,NDA2,PAT2,DIV2,DELPC
    IF(NA)2,80,81
 81 IF(NA-1)2,82,83
 82 PAT=PAT2
    GØ TØ 80
 83 IF(NA-3)70,80,84
 84 IF(NA-4)2,80,85
 85 IF(NA-5)2,82,80
 80 IF(NDA2)2,70,75
 76 IF(NDA)2,70,74
 74 NTR=NDA
    GØ TØ 70
 75 NTR=NDA2
 70 IF(INØ-9001)40,50,2
 40 SUMN=SUMN+1.
    DEL=NTR-NTE
    IF(NTY-1)2,15,16
 15 IF(TRM)17,2,18
 17 GAIN=GAIN+5.*PRM*DEL/365.
    GØ TØ 550
 18 GAIN=GAIN+100.*(PAT-PRM)
```

```
    GØ TØ 550
 16 IF(NTY-2)2,19,20
 19 IF(TRM)2,2,17
 20 IF(NTY-3)2,21,22
 21 IF(TRM)23,2,24
 23 GAIN=GAIN+10.*PRM*DEL/365.
    GØ TØ 550
 24 GAIN=GAIN+5.*PRM*DEL/365.+100.*(PAT-PRM)
    GØ TØ 550
 22 IF(NTY-4)2,25,26
 25 IF(TRM)27,2,28
 27 GAIN=GAIN+15.*PRM*DEL/365.
    GØ TØ 550
 28 GAIN=GAIN+10.*PRM*DEL/365.+100.*(PAT-PRM)
    GØ TØ 550
 26 IF(NTY-5)2,29,30
 29 IF(TRM)27,2,33
 33 GAIN=GAIN+5.*PRM*DEL/365.+200.*(PAT-PRM)
    GØ TØ 550
 30 IF(NTY-6)2,21,2
550 IF(SENSE SWITCH 1)551,549
551 YGAIN=GAIN-PGAIN
    PUNCH 60,INØ,YGAIN,GAIN
    GØ TØ 549
 50 GPCNC=GAIN/SUMN
    PUNCH 60,IC,GPCNC,SUMN,IC
    GØ TØ 600
  2 PAUSE
    GØ TØ 550
 60 FØRMAT(I5,F10.2,F10.2,15X,I5)
1345 FØRMAT(48X,2X,I5,F8.3,F5.2,F5.2)
  1 FØRMAT(I3,F8.2,I5,I4,I5,I2,F8.3,F9.3,I2,I2,I2,I5,F8.3,F5.2,5X,I5,I2)
    END
```

APPENDIX 7

```
THE FØLLØWING PRØGRAMS WERE USED IN EVALUATING QUALITY.
C      THIS PRØGRAM ASSIGNS VALUE LINE QUALITY RATINGS TØ EACH STØCK THAT
C      RØBINSØN,S WRITERS WRØTE ØPTIØNS ØN.
C      N=QUALITY RATING.
C      M=0 IF THE STØCK HAS BEEN RATED BY VALUE LINE.
C      M=1 IF THIS WRITER HAS ASSIGNED THE QUALITY RATING.
       DIMENSIØN N(300),M(300),QU(300),C(300)
       I=1
       L=I+3
   10  READ 2,N(I),M(I),N(I+1),M(I+1),N(I+2),M(I+2),N(I+3),M(I+3)
       DØ 4 K=I,L
       QU(K)=N(K)          Z THIS PUTS THE QUALITY RATING IN FLØATING PØINT FØRM
       C(K)=M(K)           Z SØ IT CAN BE USED IN CALCULATIØNS.
    4  CØNTINUE
       I=I+4
       L=I+3
       IF(I-253)10,10,5   Z THIS NUMBER MUST BE SET WHEN THE PRØGRAM IS USED.
    5  READ 1, NC,PR,NTR,NSK,NTE,NTY,ØPR,PRM,NB,NE,NA,NDA,PAT,DIV,INØ,NCC
       IF(NCC-1)13,12,11
   12  READ 1,NC
   13  PUNCH 3,NC,PR,NTR,NSK,NTE,NTY,ØPR,PRM,QU(NSK),C(NSK),NA,NDA,PAT,DIV,INØ
       GØ TØ 5
    1  FØRMAT(I3,F8.2,I5,I4,I5,I2,F8.3,F9.3,I2,I2,I2,I5,F8.3,F5.2,5X,I5,I2)
    2  FØRMAT(I1,I1,I1,I1,I1,I1,I1,I1)
    3  FØRMAT(I3,F8.2,I5,I4,I5,I2,F8.3,F9.3,F3.0,F3.0,I2,I5,F8.3,F9.5,I5)
   11  STØP
       END



C      PRØGRAM TØ TEST IF DIFFERENCE IN QUALTY EXISTS BETWEEN STØCKS ØWNED ØN
C      WHICH ØPTIØNS SØLD AND STØCKS BØUGHT TØ HEDGE ØPTIØN SALES.
C      CAN THE 2 SAMPLE MEANS TESTED BE CØNSIDERED REPRESENTATIVE ØF A CØMMØN
C      PØPULATIØN MEAN.
```

```
C     A TEST STATISTIC T, AND ITS ASSØCISTED V DEGREES ØF FREEDØM ARE CØMPUTED
C     FØR 6 CØMPARISØNS DESCRIBED BELØW.  THIS STATISTIC WILL TELL(BY CØNSULTING
C     A TABLE ØF VALUES FØR THE T DISTRIBUTIØN)AT WHAT LEVEL ØF SIGNIFICANCE WE
C     CAN SAY THE 2 DISTRIBUTIØNS TESTED HAVE THE SAME MEAN.  THE F STATISTIC
C     AND ITS ASSØCIATED DEGREES ØF FREEDØM,ANXA AND ANYA,
C     WILL TELL AT WHAT LEVEL ØF SIGNIFICANCE WE CAN SAY THE 2 DISTRIBUTIØNS
C     HAVE THE SAME VARIANCE(BY CØNSULTING A TABLE ØF VALUES FØR THE F DIST.).
      TØTCØ=0.
      TØTQU=0.
      TØTQS=0.
      ØNCVA=0.
      TQVAL=0.
      TQVAS=0.
      ØWNED=0.
      ØWNQU=0.
      ØWNQS=0.
      ØWNCØ=0.
      ØWNVL=0.
      ØWNVS=0.
      SHØRT=0.
      SHTQU=0.
      SHTQS=0.
      SØRVL=0.
      SØRQU=0.
      SØRQS=0.
   51 READ 3, NC,PR,NTR,NSK,NTE,NTY,ØPR,PRM,QUAL,CK,NA,NDA,PAT,DIV,INØ
   14 IF(PRM)6,10,8
    6 TØTCØ=TØTCØ+1.     Z TØT.TIMES STK BGHT.WHEN SØLD ØPTIØNS
      TØTQU=TØTQU+QUAL   Z TØTAL QUAL ØN THESE STØCKS
      TØTQS=TØTQS+QUAL**2.  Z SUM ØF QUALS SQUARED FØR VARIANCE CALCULATIØN.
      IF(CK-1.)2,50,10
    2 ØNCVA=ØNCVA+1.     Z NØ. ØF TIMES A STØCK WITH THIS RATING APPEARS
      TQVAL=TQVAL+QUAL   Z TØTAL QUAL.FØR VALUE LINE RATED STØCKS.
      TQVAS=TQVAS+QUAL**2.  Z SUM ØF QUALS SQUARED FØR VARIANCE CALCULATIØN.
      GØ TØ 50
```

```
  8 ØWNED=ØWNED+1.     Z NØ.TIMES SØLD ØPTIØN WHEN ØWNED STØCK + NØ.PUTS SØLD.
    ØWNQU=ØWNQU+QUAL   Z TØTAL QUAL.WHERE ØWNED STØCK AND WHERE SØLD PUTS.
    ØWNQS=ØWNQS+QUAL**2.  Z SUM ØF QUALS SQUARED FØR VARIANCE CALCULATIØN.
    IF(NTY-2)60,61,60
 61 SHØRT=SHØRT+1.     Z TØTAL NØ. ØF PUTS SØLD
    SHTQU=SHTQU+QUAL   Z TØTAL QUAL ØF PUTS SØLD
    SHTQS=SHTQS+QUAL**2.  Z SUM ØF QUALS SQUARED FØR VARIANCE CALCULATIØN.
 60 IF(CK-1.)12,50,10
 12 ØWNCØ=ØWNCØ+1.     Z NØ.TIMES V.L.STØCK ØWNED AND V.L.PUT SØLD.
    ØWNVL=ØWNVL+QUAL   Z TØTAL V.L.QUAL WHERE LØNG AND WHERE PUTS SØLD.
    ØWNVS=ØWNVS+QUAL**2.  Z SUM ØF QUALS SQUARED FØR VARIANCE CALCULATIØN.
    IF(NTY-2)50,62,50
 62 SØRVL=SØRVL+1.     Z NØ. ØF PUTS SØLD ØN VALUE LINE STØCKS.
    SØRQU=SØRQU+QUAL   Z TØTAL QUAL. ØF VALUE LINE PUTS.
    SØRQS=SØRQS+QUAL**2.  Z SUM ØF QUALS SQUARED FØR VARIANCE CALCULATIØN.
 50 IF(SENSE SWITCH 9)100,51
100 ØWEDM=ØWNED-SHØRT Z NØ.TIMES LØNG ALREADY LESS NØ.ØF PUTS.
    ØWQUM=ØWNQU-SHTQU Z TØTAL QUAL WHEN ALREADY LØNG LESS PUT QUAL.
    ØWQUS=ØWNQS-SHTQS Z SUM ØF QUALS SQUARED FØR VARIANCE CALCULATIØN.
    ØWNCM=ØWNCØ-SØRVL Z NØ.TIMES LØNG BEFØRE/VAL LINE QUAL. - PUTS.
    ØWNVM=ØWNVL-SØRQU Z LØNG BEFØRE/VALUE LINE QUAL. - PUTS.
    ØWVSS=ØWNVS-SØRQS Z SUM ØF QUALS SQUARED FØR VARIANCE CALCULATIØN.
    ØMWED=TØTCØ+SHØRT Z NØ.ØF TIMES BØUGHT STØCK  + NØ.PUTS SØLD.
    ØMWQU=TØTQU+SHTQU Z TØTAL QUAL ØF STØCKS BØUGHT AND STØCKS SØLD PUTS ØN.
    ØSWQU=TØTQS+SHTQS Z SUM ØF QUALS SQUARED FØR VARIANCE CALCULATIØN.
    ØMWNC=ØNCVA+SØRVL Z NØ.ØF TIMES BØUGHT VALUE LINE STØCKS ØR SØLD V.L. PUTS
    ØMWNV=TQVAL+SØRQU ZTØTAL QUAL ØF V.L.STØCKS BØUGHT ØR PUTS SØLD ØN.
    ØSWVS=TQVAS+SØRQS Z SUM ØF QUALS SQUARED FØR VARIANCE CALCULATIØN.
 20 PUNCH 1000,TØTQU,TØTCØ
 21 PUNCH 1000,TQVAL,ØNCVA
 24 PUNCH 1000,SHTQU,SHØRT
 25 PUNCH 1000,SØRQU,SØRVL
 26 PUNCH 1000,ØWQUM,ØWEDM
 27 PUNCH 1000,ØWNVM,ØWNCM
    PUNCH 1000,ØMWQU,ØMWED
```

```
    PUNCH 1000,ØMWNV,ØMWNC
    ISIG=1
190 GØ TØ (110,120,130,140,150,160,10),ISIG
110 XSUM=ØWQUM          Z FIRST PUNCH ØUT.
    SQSUM=ØWQUS         Z THIS SET TESTS THE QUALITY ØF ALL STØCKS HELD
    ANX=ØWEDM
    YSUM=ØMWQU          Z VERSUS ALL STØCKS BØUGHT ØN WHICH ØPTIØNS WERE SØLD.
    SECSQ=ØSWQU         Z + STØCKS SØLD PUTS ØN.
    ANY=ØMWED
    GØ TØ 180
120 XSUM=ØWQUM          Z SECØND PUNCH ØUT.
    SQSUM=ØWQUS         Z THIS SET TESTS THE QUALITY ØF ALL STØCKS HELD
    ANX=ØWEDM
    YSUM=TØTQU          Z VERSUS ALL STØCKS BØUGHT ØN WHICH ØPTIØNS WERE SØLD.
    SECSQ=TØTQS         Z (EXCLUDING NØN HELD STØCKS ØN WHICH PUTS WERE SØLD)
    ANY=TØTCØ
    GØ TØ 180
130 XSUM=ØWNVM          Z THIRD PUNCH ØUT.
    SQSUM=ØWVSS         Z THIS SET TESTS THE QUALITY ØF ALL STØCKS HELD
    ANX=ØWNCM
    YSUM=ØMWNV          Z RATED BY VALUE LINE VERSUS ALL STØCKS BØUGHT RATED BY
    SECSQ=ØSWVS         Z VALUE LINE ØN WHICH ØPTIØNS WERE SØLD + STØCKS SØLD
    ANY=ØMWNC           Z PUTS ØN, RATED BY VALUE LINE.
    GØ TØ 180
140 XSUM=ØWNVM          Z FØURTH PUNCH ØUT.
    SQSUM=ØWVSS         Z THIS SET TESTS THE QUALITY ØF ALL STØCKS HELD
    ANX=ØWNCM           Z (EXCLUDING NØN HELD STØCKS ØN WHICH PUTS WERE SØLD)
    YSUM=TQVAL          Z RATED BY VALUE LINE VERSUS ALL STØCKS BØUGHT RATED BY
    SECSQ=TQVAS         Z VALUE LINE ØN WHICH ØPTIØNS WERE SØLD.
    ANY=ØNCVA
    GØ TØ 180
150 XSUM=ØWQUM          Z FIFTH PUNCH ØUT.
    SQSUM=ØWQUS         Z THIS SET TESTS THE QUALITY ØF ALL STØCKS SØLD PUTS ØN
    ANX=ØWEDM           Z VERSUS ALL STØCKS HELD.
    YSUM=SHTQU
```

```
      SECSQ=SHTQS
      ANY=SHØRT
      GØ TØ 180
  160 XSUM=ØWNVM          Z SIXTH PUNCH ØUT.
      SQSUM=ØWVSS         Z THIS SET TESTS THE QUALITY ØF ALL STØCKS RATED BY
      ANX=ØWNCM           Z VALUE LINE ØN WHICH PUTS WERE SØLD VERSUS ALL STØCKS
      YSUM=SØRQU          Z HELD WHICH WERE RATED BY VALUE LINE.
      SECSQ=SØRQS
      ANY=SØRVL
  180 XBAR=XSUM/ANX
      YBAR=YSUM/ANY
      XNBSQ=ANX*XBAR*XBAR
      SXSQA=(SQSUM-XNBSQ)/(ANX-1.)
      SECNX=ANY*YBAR*YBAR
      SYSQA=(SECSQ-SECNX)/(ANY-1.)
      DENØM=(SXSQA/ANX)+(SYSQA/ANY)
      SQRTT=SQRTF(DENØM)
      T=(XBAR-YBAR)/SQRTT
      BETA=DENØM**2.
      V=BETA/(((SXSQA/ANX)**2./(ANX+1.))+(SYSQA/ANY)**2./(ANY+1.))-2.
      F=SXSQA/SYSQA
      ANXA=ANX-1.
      ANYA=ANY-1.
      PUNCH 1003,XBAR,YBAR
      PUNCH 1002,SXSQA,SYSQA
      PUNCH 1001,T,V
      PUNCH 1004,F,ANXA,ANYA
      ISIG=ISIG+1
      GØ TØ 190
   10 STØP
    3 FØRMAT(I3,F8.2,I5,I4,I5,I2,F8.3,F9.3,F3.0,F3.0,I2,I5,F8.3,F9.5,I5)
 1000 FØRMAT(F7.0,F7.0)
 1001 FØRMAT(F7.3,F7.2)
 1002 FØRMAT(F10.3,F10.3)
 1003 FØRMAT(F7.3,F10.3)
```

```
1004 FØRMAT(F7.3,F5.0,F5.0)
     END
```

APPENDIX 8

PRØGRAM USED TØ SIMULATE WRITER PRØFITABILITY.

```
C     THIS PRØGRAM SIMULATES THE ACTIØNS ØF A ØPTIØN WRITER FACED WITH THE
C     ØPPØRTUNITY ØF WRITING ØPTIØNS ØN THE CØNTRACTS HERE TØ BE PRØCESSED
C     WHEN HE STARTS WITH A AMØUNT ØF CAPITAL =PV.
C     HE HAS NØ CHØICE BUT TØ WRITE THE ØPTIØN IF A SUFFICIENT AMØUNT ØF CAPITAL
C     IS LEFT IN HIS ACCØUNT TØ PRØPERLY MARGIN ØR HEDGE THE CØNTRACT.
C     VEST=INVESTMENT ASSUMING CALLS ARE HEDGED AND PUTS ARE MARGINED AT 100 PER
C     CENT.  VEST IS USED HERE AS THE ACTUAL INVESTMENT LESS THE AMØUNT ØF THE
C     PREMIUM RETAINED BY THE WRITER HERE ASSUMED AT 86.5 PER CENT.
C     WØRTH=SUM ØF ØWN CAPITAL TIED UP AS HEDGE ØR MARGIN ØN ØPTIØNS ØUTSTANDING
C     WØRTH+PV THEREFØRE =AMØUNT ØF CAPITAL TIED UP IN INVESTMENT + CASH ØN HAND
C     EXCLUDING PREMIUMS ØR GAINS ØR LØSSES ASSØCIATED WITH ØPTIØNS PRESENTLY
C     EXERCISABLE. PREMIUM AND GAIN ØR LØSS IS ADDED TØ PV WHEN ACTIØN TAKEN.
C     ALL CØSTS ARE INCLUDED IN THIS SIMULATIØN EXCEPT THE CØMMISSIØN CØSTS
C     AND TRANSFER TAXES INVØLVED IN SELLING THE PUTS PUT TØ THE WRITER.
C     CØNTRACTS MUST BE ØRDERED BY TRADE DATE.
C     ASSUMES THAT IF ACTIØN ØN CØNTRACT AND ØPPØRTUNITY TØ WRITE NEW ØNE ØCCUR
C     ØN SAME DAY, THAT ACTIØN TAKEN ØCCURS FIRST.
C     WHERE A NØ. ØF ØPTIØN CØNTRACTS HAVE BEEN WRITTEN ØN THE SAME DAY, THERE
C     ØRDER IN THIS SIMULATIØN IS DETERMINED BY HØW THEY WERE NUMBERED BY THE
C     WRITER AND NØT IN THE ØRDER THEY ØCCURRED ØN THE DAY IN QUESTIØN.
      DIMENSIØN NØDE(500),INØ(500),MT(500),MTHIS(500)
      DIMENSIØN NTE(500),LN(500),LNT(500),VEST(500),PN(500)
  200 READ 100,PV
      PUNCH 101,PV
      KJ=1
      L=1
      KWA=0
      ØUT=0.
      WØRTH=0.
      N=1
      I=1
    1 READ 102,INØ(I),NTE(I),LN(I),LNT(I),VEST(I),PN(I)
```

```
    NØDE(I)=0
221 IF(PV-VEST(I))1,2,2
  2 PV=PV-VEST(I)
    WØRTH=WØRTH+VEST(I)
    ØUT=ØUT+1.
    IF(LNT(I))1234,3,4
  3 MT(I)=NTE(I)+LN(I)
    GØ TØ 11
  4 MT(I)=NTE(I)+LNT(I)
 11 MTHIS(L)=MT(I)
  5 N=N+1
 30 READ 102,INØ(N),NTE(N),LN(N),LNT(N),VEST(N),PN(N)
    NØDE(N)=0
    IF(INØ(N)-9000)13,90,1234
 90 KWA=1
    GØ TØ 91
 13 IF(NTE(N )-MTHIS(L))9,9,10
  9 JKL=1
    IF(PV-VEST(N))30,12,12
 12 PV=PV-VEST(N)
    WØRTH=WØRTH+VEST(N)
    ØUT=ØUT+1.
    IF(LNT(N))1234,6,7
  6 MT(N)=NTE(N)+LN(N)
    GØ TØ 8
  7 MT(N)=NTE(N)+LNT(N)
  8 IM=N
 50 DØ 40 K=1,IM
    IF(NØDE(K)-1)41,40,1234
 40 CØNTINUE
 41 MN=K
    MTHIS(MN)=MT(K)
    IMST=IM-1
    IF(ØUT-1.)1234,201,202
202 DØ 20 I=K,IMST
```

```
    IF(NØDE(I+1)-1)60,20,1234
 60 IF(MT(I+1)-MTHIS(MN))21,20,20
 21 MN=I+1
    MTHIS(MN)=MT(I+1)
 20 CØNTINUE
201 L=MN
 91 IF(KWA-1)70,10,1234
 70 GØ TØ (5,13),JKL
 10 JKL=2
    PV=PV+VEST(L)+PN(L)
    WØRTH=WØRTH-VEST(L)
    ØUT=ØUT-1.
    WT=WØRTH+PV
    NØDE(L)=1
    MMM=L
    PUNCH 110,INØ(L),NTE(L),MT(L),VEST(L),PN(L),PV,WØRTH,WT
    IF(WØRTH)1234,210,50
210 IF(KWA-1)220,200,1234
220 I=N
    L=L+1
    GØ TØ 221
101 FØRMAT(41H THIS SIMULATIØN ASSUMES INITIAL CAPITAL=F10.2)
100 FØRMAT(F10.2)
102 FØRMAT(I4,12X,I5,I4,I4,F9.2,9X,F9.2)
110 FØRMAT(I5,I5,I5,F9.2,F10.2,F10.2,F10.2,F10.2)
1234 STØP
    END
```

APPENDIX 9

APPENDIX 9

QUESTIONNAIRE

(1) Have you ever bought put or call options?
1. Yes _____
2. No _____

(2) How many options have you purchased in the past? _____

(3) How many years (or months) ago was your first option purchased?

_____

(4) How long ago was your most recent option purchase? _____

(5) Were your option purchases mostly 6-month options or mostly options of shorter duration?
1. Mostly 6-month duration _____
2. Mostly options of shorter duration _____

(6) In the future, how likely is it that you will buy put or call options again?
1. Definitely will buy a put or call option at some time _____
2. Probably will buy a put or call option at some time _____
3. May buy a put or call option at some time _____
4. Probably will not buy a put or call option _____
5. Definitely will not buy a put or call option _____

(7) If you answered 1, 2, or 3 to the previous question, what kind of opportunity need exist for you to buy a put or call option?

(8) If you answered 4 or 5 to question (6), why not?

(9) Did you purchase put and/or call options because you:
1. Expected an unusually large price movement in the stock on which the option was purchased. _____
2. Wished to protect a paper profit. _____
3. Wished to protect an investment (please explain).

4. Other reasons (please explain).

(10) If more than one reason was given in question (9), please rank them in the order of their importance to you:

Rank first : Reason number _____
second: " " _____
third : " " _____
fourth: " " _____

(11) If you expected an unusually large price movement in the stock on which the option was purchased, how did you decide such a price movement would occur?

(12) Did you buy straddles? 1. Yes _____
2. No _____

If yes, how?

(14) Do you feel the benefits you have gained from options have been worth the cost of purchasing them? Please explain.

(15) What advantages, other than those already mentioned, do you feel are to be gained from purchasing stock options?

The following questions are being asked so that I can classify the people who are answering this questionnaire.

(16) Age:
1. 20 or less____
2. 21 - 30____
3. 31 - 40____
4. 41 - 50____
5. 51 - 60____
6. 61 - 70____
7. 71 - 75____
8. Over 75____

(17) Sex:
1. Male____
2. Female____

(18) Married:
1. Yes____
2. No____

(19) Number of dependent children:
0____
1____
2____
3____
More than 3____

(20) Schooling completed:

1. No formal schooling_____
2. Some grammar schooling_____
3. Grammar school_____
4. Some high schooling_____
5. High school_____
6. Some college_____
7. College graduate_____
8. Post-graduate degree_____

(21) Occupation:

1. Professional_____
2. Stock broker_____
3. Executive_____
4. Merchant_____
5. Security analyst_____
6. Housewife_____
7. Retired_____
8. Manual worker_____
9. Office worker_____
10. Other (please specify)

_____

_____

(22) Approximate annual total income (earned income + pension and social security payments + net capital gains and losses)

1. $ 0 - 5,000_____
2. 5,001 - 8,000_____
3. 8,001 - 10,000_____
4. 10,001 - 13,000_____
5. 13,001 - 16,000_____
6. 16,001 - 20,000_____
7. 20,001 - 25,000_____
8. 25,001 - 50,000_____
9. 50,001 - 100,000_____
10. 100,000 and over _____

(23) Approximate face value of life insurance owned:

1. none owned_____
2. $ 1 - 10,000_____
3. 10,001 - 20,000_____
4. 20,001 - 30,000_____
5. 30,001 - 40,000_____
6. 40,001 - 50,000_____
7. 50,001 - 75,000_____
8. 75,001 - 100,000_____
9. 100,001 - 200,000_____
10. 200,000 and over _____

(24) Approximate market value of bonds owned:

1. none owned _____
2. $ 1 - 1,000 _____
3. 1,001 - 5,000 _____
4. 5,001 - 10,000 _____
5. 10,001 - 25,000 _____
6. 25,001 - 50,000 _____
7. 50,001 - 100,000 _____
8. 100,001 - 200,000 _____
9. 200,001 - 500,000 _____
10. 500,001 and over _____

(25) Approximate market value of common stock owned (including mutual funds):

1. none owned _____
2. $ 1 - 1,000 _____
3. 1,001 - 5,000 _____
4. 5,001 - 10,000 _____
5. 10,001 - 25,000 _____
6. 25,001 - 50,000 _____
7. 50,001 - 100,000 _____
8. 100,001 - 200,000 _____
9. 200,001 - 500,000 _____
10. 500,001 and over _____

BIBLIOGRAPHY

Alexander, S. S., "Price Movements in Speculative Markets: Trends or Random Walks", Industrial Management Review, May, 1961.

Allen, R. G. D., Mathematical Analysis for Economists (New York: St. Martin's Press, 1956).

Bernhard, A., The Evaluation of Common Stocks (New York: Simon and Schuster, 1959).

Boness, A. J., "Some Evidence on the Profitability of Trading in Put and Call Options," A forth coming paper.

Bowker, A. H., and Lieberman, G. J., Handbook of Industrial Statistics, (Englewood Cliffs: Prentice-Hall, 1955).

Division of Trading and Exchanges, Securities and Exchange Commission, "Report on Put and Call Options," Aug., 1961.

Ehrlich, P. R., "Puts and Calls," Barron's, March 3, 1958, 5-6.

Filer, H., Understanding Put and Call Options. (New York: Crown Publishers, 1959).

Fisher, R. A. and Yates, F. R. S., Statistical Tables for Biological, Agricultural and Medical Research, (New York: Hofner Publishing Co., Inc., 1957).

Franklin, C. B., and Colberg, M. R. "Puts and Calls: A Factual Survey," The Journal of Finance, XIII, No. 1, March, 1958, 21-34.

"Functional Put and Call Option Writing." A pamphlet distributed by Henry Blair and Co., Member, Put and Call Brokers and Dealers Association.

Kruizenga, R., "Put and Call Options: A Theoretical and Market Analysis," Unpublished Ph.D. thesis, M. I. T., 1956.

Kruizenga, R., "The Profit Returns in the Purchase of Puts and Calls," Unpublished paper.

Maroney, M. J., Facts From Figures (Baltimore: Penguin Books, 1960).

Massey, F. J., Jr., "The Kolmogorov-Smirnov Test for Goodness of Fit," Journal of the American Statistical Association, March, 1951, Vol. 46, 68-78.

"Puts and Calls: An Old Investment Technique Wins New Popularity," Barron's, Vol. XXXV, No. 36, Sept. 5, 1955, 13-14.

Reinach, A. M., The Nature of Puts and Calls (New York: The Bookmaster, 1961).

Whiting, R., Profitable Trading with Puts and Calls (New York: R. H. M. Associates, 1959).